

Environmental Impact Statement Update - 400 Millennium Boulevard, Waterloo Ontario

Final Report

May 14, 2025

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Limitations and Sign-off

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Abbreviations

ALAN	Artificial Light at Night
ANSI	Areas of Natural and Scientific Interest
CA	Conservation Authority
CAA	Conservation Authorities Act, 1990
City	City of Waterloo
DFO	Fisheries and Oceans Canada
ECCC	Environment and Climate Change Canada
EIS	Environmental Impact Statement
ELC	Ecological Land Classification
ESA	Endangered Species Act, 2007
ESC	Erosion and Sediment Control
GIS	Geographic Information System
GGH	Greater Golden Horseshoe
GRCA	Grand River Conservation Authority
ha	Hectares
HDF	Headwater Drainage Feature



HDFA	Headwater Drainage Feature Assessment
LIO	Land Information Ontario
m	Metres
MBCA	<i>Migratory Birds Convention Act, 1994</i>
MECP	Ministry of the Environment, Conservation and Parks
MHBC	MacNaughton Hermesen Britton Clarkson Planning Limited
MMHA	Ministry of Municipal Affairs and Housing
MNRF	Ministry of Natural Resources and Forestry
NHIC	Natural Heritage Information Centre
OP	Official Plan
PSW	Provincially Significant Wetland
PPS	Provincial Policy Statement, 2020
Region	Region of Waterloo
SAR	Species at Risk
SARA	Species at Risk Act, 2002
SARO	Species at Risk in Ontario
SOCC	Species of Conservation Concern
SWH	Significant Wildlife Habitat



SWM	Storm Water Management
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ToR	Terms of Reference
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Glossary

Subject Lands	Lands associated with municipal address 400 Millennium Boulevard in Waterloo Ontario (as depicted in Figure 1).
Adjacent Lands	Lands within 120m of the Subject Lands.
Study Area	The area used to consider potential impacts to natural heritage features, including the Subject Lands and Adjacent Lands.
The Project	The proposed development on the Subject Lands that have the potential to impact the natural heritage features within the Study Area.



1 Introduction

Stantec Consulting Ltd. (Stantec) was retained by Activa Holdings Inc. (Activa), care of MacNaughton Hermesen Britton Clarkson Planning Limited (MHBC), to complete an Environmental Impact Statement (EIS) in support of a mixed-use subdivision development proposal for lands associated with municipal address 400 Millennium Boulevard in Waterloo, Ontario, and legally described as Block 320 Registered Plan 58M-506 (Geographic Township of Waterloo), City of Waterloo, Regional Municipality of Waterloo (herein referred to as the “Subject Lands”) (**Figure 1, Appendix A**).

The Subject Lands encompasses approximately 15 hectares (ha) of undeveloped land currently used for agricultural purposes. The Subject Lands has been identified by the City of Waterloo (City) as a Designated Greenfield Area (City Official Plan Schedule ‘B3’).

Activa, care of MHBC (the proponent), wishes to develop a mixed-use subdivision including medium-high density residential lots and commercial lots. The Draft Plan of Subdivision reviewed (MHBC dated March 15, 2023) also includes parking lots, various access roads, a stormwater Management Pond and a public park on the Subject Lands, herein referred to as the “Project”.

The Subject Lands are located within an urban matrix and is bound by Country Squire Road to the north followed by agricultural fields and one residential property; Millennium Road to the east and south followed by a residential subdivision and Manulife Financial Sportsplex; and an unevaluated wetland and woodland feature to the west. The Waterloo Rural East Wetland is approximately 190 metres (m) east of the Subject Lands Boundary (**Figure 2, Appendix A**).

The Subject Lands are located within the City of Waterloo and within the administrative jurisdiction of the Grand River Conservation Authority (GRCA). Given this geographical setting, development applications concerning the Subject Lands are subject to policies including, but not limited to, those outlined in: the 2020 Provincial Policy Statement (PPS) (Ministry of Municipal Affairs and Housing [MMAH] 2020) and the Growth Plan for the Greater Golden Horseshoe (MMAH 2020) under the *Planning Act, 1990*, the Regional Official Plan (OP) (Region of Waterloo 2015), the City of Waterloo OP (City of Waterloo, 2020), GRCA regulations and policies, and the *Endangered Species Act, 2007* (ESA).

Stantec prepared an EIS which included the Subject Lands in 2008. Given the date of the 2008 report and review of agency consultation correspondence, a new EIS has been requested as part of the application package to support the Project. The purpose of this EIS is to describe existing conditions and evaluate Project conformance with the PPS and other applicable natural heritage legislation and municipal policy requirements (e.g., ESA). This EIS also includes an impact assessment and provides recommendations for mitigation measures.



2 Approach

Agency stakeholders were consulted regarding the proposed approach for assessing natural heritage in the Study Area in early spring 2023. A Terms of Reference (ToR) was circulated to the City, Region, and GRCA on April 17, 2023, for review and comment. The ToR described the scope of the EIS including the proposed field program and associated reporting. The ToR and associated agency correspondence records are provided in **Appendix B**.

A site visit with staff from MHBC, the City Waterloo, Region of Waterloo, and GRCA took place on June 14, 2023. The purpose of the site visit was to review natural heritage features within the Study Area and discuss permitting requirements and natural heritage constraints to the proposed development. It was also the purpose of the meeting to stake the limits of wetland and woodland features on or adjacent to lands where development works are proposed.



3 Methodology

3.1 Study Area

Stantec completed a review of background information and visited the Subject Lands to characterize the natural heritage resources and functions on and adjacent to the Subject Lands. Lands within a 120 m radius of the Subject Lands were included in the assessment to account for a review of Adjacent Lands as defined by municipal and provincial planning documents. The total lands reviewed as part of the assessment herein, are referred to as the Study Area (**Figure 1, Appendix A**). The information sources reviewed, and field program undertaken in the Study Area are summarized below in **Sections 3.2 and 3.3**.

3.2 Background Review

Background information was gathered and reviewed as part of the assessment process and prior to completing the field program to inform targeted field surveys. The following sections outline the methodology for completing the various components of the background review.

3.2.1 Policy Review

Given the geographic location of the Study Area, the following documents including associated maps and schedules were reviewed to determine the legislative and policy context of the Project as well as ascertain the presence and location of previously identified natural heritage features and areas within the Study Area:

- Species at Risk Act (2002) (SARA)
- Fisheries Act (1985)
- Migratory Birds Convention Act (1994) (MBCA)
- Canada Wildlife Act (1985) (CWA)
- Endangered Species Act (2007) (ESA)
- Conservation Authorities Act (1990) (CAA)
- Grand River Conservation Authority (GRCA) policies and regulations
- Ontario Fish and Wildlife Conservation Act (1997) (FWCA)
- Provincial Policy Statement (2020) (PPS)
- A Place to Grow – Growth Plan for the Greater Golden Horseshoe (2020) (Growth Plan)
- Regional Official Plan (Region of Waterloo 2015)
- City of Waterloo Official Plan (City of Waterloo 2022)



3.2.2 Previous Site Documentation

Stantec prepared an EIS that included the Subject Lands in 2008 in support of Registration. Data collected during the field program undertaken for the Rural East District Lands EIS (File No. 160310788) prepared by Stantec (Stantec 2008) was reviewed and included in this EIS update.

3.2.3 Geo-mapping and Database Reviews

Additional sources of information such as soil geology and physiography mapping, wildlife atlas data, watercourse and natural resource mapping were reviewed prior to commencing the field program.

In addition to mapping resources associated with the documents listed in **Section 3.2.1**, the following databases and information sources were reviewed as part of the background review:

- Natural heritage and physical feature layers from the Land Information Ontario (LIO) database which includes Ministry of Natural Resources and Forestry (MNRF) resource information (LIO 2023)
- The Natural Heritage Information Centre (NHIC) database available through the MNRF's Make a Map: Natural Heritage Areas, including review of Provincially Tracked Species Layer and provincial Aquatic Resource Area (ARA) data (MNRF 2023)
- Species at Risk in Ontario List, including provincial range maps, (Ministry of the Environment, Conservation and Parks [MECP] 2023)
- Atlas of the Breeding Birds of Ontario (Second Atlas, 10 km grid), (Cadman et al., 2007)
- Ontario Reptile and Amphibian Atlas (10 km grid), (Ontario Nature 2023)
- eBird Canada Database (eBird Hotspots within the Study Area as defined in **Figure 1, Appendix A**), (eBird Canada 2023)
- Insect / Butterfly Atlas (10 km grid), (Toronto Entomologists' Association 2023)
- Mammalian observation database (City of Toronto area search), (iNaturalist 2023)
- Atlas of the Mammals of Ontario (Dobbyn 1994)
- Fisheries and Oceans Canada's (DFO) Aquatic Species at Risk Map (DFO 2023)
- GRCA technical reports including applicable watershed plans databases and geo-cortex mapping resources
- Constructed Drains digital dataset (OMAFRA, 2023)
- High resolution satellite imagery of the Study Area (Google Earth Pro 2023, LIO 2023)

The results of these reviews were used to guide field investigations and to identify potential Species at Risk (SAR) and species of conservation concern (SOCC) habitat, aquatic habitats, and other natural heritage features and areas that have the potential to overlap with the Study Area. With exception of some hotspots (e.g., eBird), many of the wildlife record database resources generally do not provide the exact locations of a species occurrence record; accuracy generally ranges from 1 km² (e.g., NHIC) to



10 km² for most wildlife atlases. As such, the results of the range map and atlas reviews were used to support the SAR and SOCC habitat screening assessments and identify additional target areas for assessment.

3.3 Field Program

The field program was carried out in 2023 and included surveys for vegetation, wildlife and wildlife habitat, and aquatic habitat. Field investigations completed for the Project are summarized in Table 3-1.

Lands outside of the legal boundaries of the Subject Lands but within the Study Area were predominantly evaluated based on secondary sources, as outlined in **Section 3.2**, and from the edge of the property due to access restrictions on privately owned lands. Where feasible / accessible, Adjacent Lands were visited. A portion of the woodlands west of the Subject Lands (Block 326) are owned by the Proponent (see Plan A1 located in **Appendix G** for details). Block 326 was accessed and assessed during the field program.

Table 3-1 Field Investigation Summary

Type of Field Work	Date(s) of Field Work	Stantec Personnel
Vegetation Surveys		
2023 Floral inventory and Ecological Land Classification	24-May-23 14-Jun-23 24-Jul-23	M. Razzouk / L. Cymbaly L. Cymbaly M. Razzouk
2024 Floral inventory	19-Sept-24 10-Oct-24	L. Cymbaly B. Miller
Feature Delineation¹		
Wetland Delineation	14-Jun-23	L. Cymbaly
Woodland Delineation	14-Jun-23	L. Cymbaly
Wildlife Surveys		
Breeding Bird Surveys	25-May-23	J. Randall
	8-Jun-23	J. Randall
	20-Jun-23	J. Randall
Wildlife Habitat and Incidental Wildlife Observations	During all field visits	All Staff
Headwater Drainage Feature Assessment		
Visit #1	30-Mar-23	J. Brooks
Visit #2	23-May-23	J. Brooks

1. Feature delineation was completed on site by Stantec staff with the Proponent and agencies as described in **Section 2**.



3.3.1 Vegetation Survey and Ecological Land Classification

Vegetation community mapping for the Study Area was completed in accordance with the Ecological Land Classification (ELC) system for southern Ontario (Lee et al., 1998) using the updated 2008 coding system to describe community vegetation types. Vegetation communities were delineated based on satellite imagery prior to field surveys and subsequently verified in the field.

Provincial status of vegetation communities was based on the rankings assigned by the NHIC (MNR 2023). A list of vascular plant species observed in the Study Area was compiled during vegetation surveys. The nomenclature and provincial status of all plant species was based on NHIC (MNR 2023a). Identification of potentially sensitive native plant species was determined from their assigned coefficient of conservatism (CC) value (Oldham et al 1995). The CC value ranges from 0 (low) to 10 (high) and is based on a species' tolerance of disturbance and fidelity to a specific natural habitat. Species with a CC value of 9 or 10 generally exhibit a high degree of fidelity to a narrow range of habitat parameters. The Regional Municipality of Waterloo Listing of Regionally significant Native Vascular Plants (Approved by Regional Council, June 1999) was also reviewed as part of the assessment.

3.3.2 Feature Delineation

3.3.2.1 Wetland

Delineation of wetland features followed the methodology outlined in the Ontario Wetland Evaluation System (OWES); Southern Manual prepared by MNR (MNR 2022). Natural heritage features of interest were reviewed during the site meeting which included staff from Stantec, MHBC, the GRCA, the City and Region on June 14, 2023. Given the extent of the large swamp in the center of the woodland feature and boundary relevance to the Project, Stantec's OWES qualified staff and survey team staked the east end of Block 326 with the GRCA during the June 14 site visit. A copy of the Ontario Land Surveyor (OLS) survey is provided in **Appendix G**. Provincial delineation data was used to approximate the remainder of the western portion of the wetland (**Figure 3, Appendix A**).

3.3.2.2 Woodland

Natural heritage features of interest were reviewed during the site meeting with the MHBC, GRCA, City and Region on June 14, 2023. The woodland dripline was staked by the City, Region and Stantec's qualified staff and survey team on June 14, 2023. A copy of the Ontario Land Surveyor (OLS) survey is provided in **Appendix G**.

3.3.3 Breeding Bird Surveys

Breeding bird surveys were completed on May 25, June 8, and June 20, 2023. Surveys consisted of walking systematically through the Study Area, recording all species of birds that were seen or heard within each of the different vegetation communities. Five-point count stations were established within the Study Area and are shown on **Figure 3, Appendix A**. Point count methods followed Environment and Climate Change Canada's (ECCC) Breeding Bird Survey (ECCC 2023). A tally of each bird species was recorded during the three-minute survey period that included an approximation of the location and



direction of each bird observation within or just beyond a 100 m radius. Breeding evidence codes, as described by the Atlas of the Breeding Birds of Ontario, 2001-2005 (Cadman et al. 2007), were assigned to each of the species based on the field observation. All birds seen or heard in suitable habitat during the breeding season were assumed to be breeding.

Surveys were completed between a half an hour before sunrise and 10:00 a.m. Weather conditions (i.e., precipitation and visibility) were within the parameters required by monitoring programs such as ECCC Breeding Bird Survey (ECCC 2023) and the Ontario Breeding Bird Atlas Guide for Participants (Federation of Ontario Naturalists 2001). Survey effort and weather is summarized in Table 3-2.

Table 3-2 Breeding Bird Survey Dates, Times, and Weather Conditions

Date	Time (24hrs)	Temp. (°C)	Wind (Beaufort)	Cloud (%)	Precipitation (mm)
May 25, 2023	0628 - 0802	2 - 3	2	30-40	0
June 8, 2023	0705 - 0836	13 - 14	2	50	0
June 20, 2023	0617 - 0754	15	2	30	0

3.3.4 Species at Risk Habitat Suitability Assessment

SAR habitat assessments were completed concurrently with vegetation surveys and focused on identifying potential SAR habitat (e.g., SAR snake hibernacula, SAR bat maternity roost trees) or occurrences (e.g., Butternut). SAR habitat assessments were completed for species protected under the ESA that may occur in the area, including species identified in the NHIC database and Ontario wildlife atlases during the background review. If encountered, these features were identified, recorded, and assessed for potential use by SAR. Wildlife species observed by sight, sound and/or through distinctive signs (e.g., tracks, scat) were also recorded.

The presence of SAR was determined using targeted surveys for vegetation and breeding birds. For other species, habitat assessments were completed to determine their likelihood of occurrence. SAR with suitable habitat and at least one recent record and/or an overlapping range in the Study Area were considered to have a reasonable probability of occurring.

3.3.5 Wildlife Habitat Assessment

Wildlife habitat is defined as an area where plants, animals and other organisms live, including areas where species concentrate at a vulnerable point in their life cycle and that are important to migratory and non-migratory species. The MNRF's Significant Wildlife Habitat Technical Guide (SWHTG) (MNR 2000) describes Significant Wildlife Habitat (SWH) in four categories:

- Seasonal concentration areas
- Rare vegetation communities or specialized habitats for wildlife
- Habitats of SOCC (excluding the habitats of END or THR species)
- Animal movement corridors



Habitats within the Study Area were assessed for candidate SWH, as defined in the Ecoregion 6E Criterion Schedule (MNRF 2015). Wildlife observations and evidence of wildlife (e.g., tracks, burrows, vocalizations) were recorded during site visits. SOCC with suitable habitat and at least one existing record and/or an overlapping range within the Study Area were considered to have a reasonable probability of occurring.

3.3.6 Fish and Fish Habitat / Headwater Drainage Feature Assessment

Headwater drainage feature assessment and fish and fish habitat assessment were completed between March 30 and May 23, 2023, during two separate visits.

3.3.6.1 Headwater Drainage Assessment

Conditions at four HDFs identified through the background review (described in **Section 3.3**) were characterized in accordance with the *Evaluation, Classification and Management of Headwater Drainage Features Guidelines* (TRCA & CVC 2014). The guidelines prescribe up to three site visits, as described below (TRCA & CVC 2014):

First Visit – Determine the feature type and flow condition of drainage features. If no water is present, or only standing water is found, no further site visits are required. Completed immediately following freshet (typically late March or early April).

Second Visit – Assessment of fish presence, habitat potential, and flow condition. Fish presence determined using backpack electrofishing techniques. If no water is present a third visit is not required. Completed late April to early May, ideally following several days with no precipitation events.

Third Visit – Determine upstream limit to water presence and flow condition for the feature. If standing pools of water are present, fish presence will again be determined using backpack electrofishing techniques. Completed from July to mid-September, ideally following several days with no precipitation events.

As noted in **Table 3-1**, the HDF surveys were completed on March 30 and May 23, 2023. Based on the results of the first and second site assessments, a third site assessment was not required. The locations of the four HDF assessments are shown on **Figure 3, Appendix A**.

3.3.6.2 Aquatic Habitat Features

No mapped watercourses were identified during the background review (as described in **Section 3.3**). The field investigation included assessing the potential presence of unmapped surface water features and, if necessary, recording habitat characteristics, including but not limited to channel dimensions, substrate, morphology, cover for fish, and riparian conditions according to the *Ontario Stream Assessment Protocol* (Stanfield 2010) to characterize watercourses.



3.4 Species and Habitat Screenings

The methods for screening species and their habitats within the Study Area incorporated the results of the background review, habitat characterizations, and species or species group specific surveys using standardized protocols for determining presence/absence, as described in **Sections 3.2 and 3.3**. The background and site-specific data were used to identify species and features that may be affected by the Project.

3.4.1 Species At Risk and Species of Conservation Concern Habitat Screenings

For the purposes of this report, SAR include species that are listed as Extirpated (EXT), Endangered (END) or Threatened (THR) on the Species at Risk in Ontario list as published in Ontario Regulation 230/08, under the ESA. Species with these statuses receive both individual and habitat protection under the ESA. Aquatic SAR also include those that are identified as EXT, END or THR and are afforded protection under both the provincial ESA and the federal SARA.

The Natural Heritage Reference Manual (NHRM) was developed to provide technical guidance for implementing the natural heritage policies of the PPS (MNR, 2010). SWH includes the habitat of SOCC. Species with provincial ranks (Subnational Rank [S-Rank]) of S1 to S3 are tracked by the MNRF and are considered SOCC. S-Ranks are defined as follows:

- S1: Critically imperiled; usually fewer than 5 occurrences
- S2: Imperiled; usually fewer than 20 occurrences
- S3: Vulnerable; usually fewer than 100 occurrences
- S4: Apparently secure; uncommon but not rare, usually more than 100 occurrences
- S5: Secure, common, widespread, and abundant

Regionally rare species, species listed as Special Concern (SC) under the ESA, and species identified as nationally END or THR by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), which are not protected under the ESA, are also considered SOCC.

Although SOCC do not receive legal protection under the ESA, their habitat is protected under the PPS (e.g., if it qualifies as SWH), and they may also be afforded protection under the MBCA or Ontario *Fish and Wildlife Conservation Act* (1997).

SAR and SOCC with recent occurrence records (i.e., within the last 20 years) or with overlapping habitat ranges within the Study Area, were considered in the assessment utilizing the data sources described in **Section 3.2**. Species with recorded observations of greater than 20 years old were considered historical in accordance with the standard Conservation Status Assessment Methodology (NatureServe 2019). This standard is consistent with what the NHIC uses to evaluate a species' S-Rank.



The potential for SAR and SOCC to occur within the Study Area was assessed by comparing species habitat requirements to the habitat conditions observed on-site during the field program. The following probability assessment criteria was applied to the SAR and SOCC habitat screenings:

Low Probability: suitable habitat was not observed throughout the field program but there is a known species record in the general area, or potentially suitable habitat was observed during the field program but the results of a wildlife survey (e.g., breeding bird survey) did not determine species presence.

Medium Probability: the species not observed during the field program, however potentially suitable habitat has been identified and there is a known species record in the general area.

High Probability: good quality habitat was identified (e.g., sufficiently large areas of suitable vegetation and presence of key features such as nesting sites) and there are known species record in the Study Area.

Confirmed: the species was observed in suitable habitat during the 2023 field program.

Absent: Habitat criteria is specialized (e.g., watercourse, caves, alvars, habitat greater than a certain acreage, etc.) and has been confirmed as not present through habitat assessment or wildlife survey.

3.4.2 Significant Wildlife Habitat Screening Assessment

The Study Area was assessed for the presence of candidate SWH features following the Significant Wildlife Habitat Technical Guide (MNR 2000) and in accordance with the evaluation criteria described in the Significant Wildlife Habitat Criteria Schedules appropriate for the Study Area's Ecoregion.

The Study Area is located within the Lake Simcoe-Rideau Ecoregion (Ecoregion 6E). The Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (MNRF 2015) contain information and criteria for identifying SWH. SWH is defined by the province as areas that have important ecological features and functions, and which support sustainable populations of plants, wildlife, and other organisms within a particular Ecoregion. The MNRF generally categorizes SWH into the following five categories:

- Seasonal Wildlife Concentration Areas
- Rare Vegetation Communities
- Specialized Habitat for Wildlife
- Habitats of SOCC
- Animal Movement Corridors

Wildlife occurrence records as described in **Section 3.2.3** as well as field data collected throughout the field program as described in **Section 3.3** were assessed to inform the presence of SWH within the Study Area based on the habitat criteria identified in the Ecoregion 6E schedules. The following probability assessment criteria was applied to the SWH habitat screenings:



Low Probability: suitable SWH habitat was not observed throughout the field program but there are known wildlife records in the general area, or potentially suitable SWH habitat was observed during the field program but there are no wildlife records or field observations through survey (e.g., breeding bird survey) for the SWH species group of interest.

Medium Probability: potential SWH habitat is present in the Study Area and there are known wildlife records in the general area.

High Probability: good quality SWH habitat has been identified (e.g., sufficiently large areas of suitable vegetation and presence of key features such as nesting sites) and there are known wildlife records in the general area.

Confirmed: the species (or wildlife group) was observed in suitable habitat during the 2023 field program.

Absent: SWH habitat criteria is specialized (e.g., caves, alvars, habitat greater than a certain acreage, etc.) and has been confirmed as not present.

Where a medium or high probability has been determined, the SWH is considered 'Candidate SWH'. Specifically, Candidate SWH refers to potential habitats that may meet the habitat criteria but have not been confirmed through additional detailed studies.



4 Results

The results of the background review and field program, as described in **Section 3** are outlined below. The species described herein use provincial common names (MNRF 2023). All common names and associated scientific names and species status are detailed in **Appendix C** and **D**, respectively.

4.1 Legislation and Policy Context

Stantec completed a review of relevant legislation and natural heritage policies across tiers of government that are applicable to the Subject Lands in the context of the proposed development. The results of the review are outlined below and further assessed in **Section 6.4** of this report to document Project conformity based on the required permits and authorization and in light of the implementation of the mitigation measures recommended, as described in **Section 6.3**.

4.1.1 Federal

4.1.1.1 Species at Risk Act, 2002

The federal SARA protects and provides recovery strategies for SAR listed as EXT, END or THR under Schedule 1. This legislation applies to species residing on federal lands, federally regulated projects, species with critical habitat on non-federal lands in specific circumstances, or aquatic species and migratory birds listed on Schedule 1. The Project does not occur on federal lands and is not subject to the SARA regulations with the exception of aquatic species and migratory birds listed on Schedule 1.

4.1.1.2 Fisheries Act, 1985

The federal *Fisheries Act* is the primary legislation governing fish and fish habitat in Canada. The Fisheries Act defines fish habitat as “...*waters frequented by fish and any other areas on which fish depend directly or indirectly in order to carry out their life processes including spawning grounds and nursery, rearing, food supply and migration areas.*” The fish and fish habitat protection provisions of the Fisheries Act apply to all fish and fish habitat in Canada. The Act prohibits activities that result in the death of fish or the harmful alteration, disruption, or destruction (HADD) of fish habitat unless authorized by the Minister of Fisheries, Oceans, and the Canadian Coast Guard. If it is determined that the death of fish or HADD of fish habitat is unavoidable as part of the Project, an authorization under the Fisheries Act may be required.



4.1.1.3 Migratory Birds Convention Act, 1994

The federal MBCA is intended to protect migratory birds, their eggs, and their active nests. The MBCA prohibits the possession, destruction, and harm of migratory birds and/or their active nests and prohibits the release of harmful substances in areas frequented by migratory birds. Under the MBCA, the nesting period for most migratory birds for Nesting Zone C1 that encompasses the Project is from April 1 to August 31, during which time vegetation removal is strongly discouraged to avoid contravention of the MBCA (Government of Canada 2022). However, if vegetation clearing must occur during this timing window, active nest searches may be conducted in simple habitats defined by Environment and Climate Change Canada (2019) as “often man-made settings with only a few likely nesting spots or small community of migratory birds”.

4.1.2 Provincial

4.1.2.1 Provincial Planning Statement (2024)

The PPS was issued under Section 3 of the Ontario *Planning Act, 1990*, R.S.O. 1990, c. P.13 and first came into effect on May 22, 1996. The PPS has been updated several times since 1993. The 2024 PPS came into effect on October 20, 2024. Decisions made by municipal planning authorities shall be consistent with the policy statements issued under the Planning Act, such as the PPS, which includes policies on development and land use patterns, resources and public health and safety.

Section 4.1 of the PPS provides direction to regional and local municipalities regarding planning policies specifically for the protection and management of natural heritage features and resources. The NHRM (MNR 2010) is a technical document used to help assess the natural environment to identify natural heritage or significant features and areas. The natural heritage policies outlined in Section 4.1 of the PPS relate to the following features:

- Natural heritage systems
- Natural heritage features and areas
- Significant wetlands
- Significant coastal wetlands
- Significant woodlands
- Significant valleylands
- Significant wildlife habitat
- Significant Areas of Natural and Scientific Interest (ANSIs)
- Fish habitat
- Habitat of END and THR species



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Each of the aforementioned features or defined areas are afforded varying levels of protection subject to municipal policies, guidelines, and in some cases, regulations. Habitat of END or THR species are regulated by the MECP if a species is identified on a property through site specific investigation or in some cases, through existing habitat information. Fish habitat is governed by DFO. The remaining features are generally governed by the municipality or other planning authority.

The Study Area falls within Ecoregion 6E. Section 4.1.4 of the PPS (2024), states that development and site alteration shall not be permitted in the following features in Ecoregion 6E:

- significant wetlands
- significant coastal wetlands

Section 4.1.5 of the PPS states that development and site alteration shall not be permitted in the following features, unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions:

- significant woodlands
- significant valleylands
- significant wildlife habitat
- significant areas of natural and scientific interest
- coastal wetlands that are not subject to policy 4.1.4.b)

Further, Sections 4.1.6 and 4.1.7 state that development and site alteration shall not be permitted in the following features, except in accordance with provincial and federal requirements:

- habitat of END or THR species
- fish habitat

The Study Area encompasses undeveloped lands which may support natural features and areas covered under Section 4.1 of the PPS. Given the above, the natural heritage policies outlined in the PPS require consideration in the EIS to move forward with development or site alteration activities on the Subject Lands.

4.1.2.2 Endangered Species Act, 2007

The provincial ESA came into effect on June 30, 2008, and replaced the former 1971 Act. The ESA protects those species listed on the Species at Risk in Ontario List (O. Reg. 230/08) as EXT, END or THR on provincial, crown, or private lands. Sections 9 and 10 of the ESA prohibit the killing, harassment, capture or taking of living individuals of SAR or damaging or destroying their habitat. Therefore, where a proposed activity will impact protected species or habitat, changes to timing, location and methods of the proposed activity should be considered, wherever feasible, to avoid impacts to SAR. Where impacts cannot be avoided or mitigated, a permit process can be initiated.



4.1.2.3 Conservation Authorities Act, 1998

The Study Area falls under the jurisdiction of the GRCA. Ontario Regulation (O. Reg.) 150/06 under Section 28 of the CAA establishes regulated areas within GRCA's jurisdiction where development could be subject to flooding, erosion, or dynamic beaches, or where interference with wetlands and alterations to watercourses might have an adverse effect on those environmental features.

4.1.2.3.1 Ontario Regulation 41/24

The GRCA regulates hazard lands including watercourses, valleylands, shorelines, and wetlands under Ontario Regulation (O. Reg) 41/24. The Subject Lands are within the regulation limits defined by GRCA.

GRCA visited the Subject Lands on June 14, 2023. The purpose of the meeting was to review natural heritage features on and directly adjacent to the Subject Lands and discuss permitting requirements and potential natural heritage constraints to the proposed development. The meeting included a review of regulated features and staking of the limits of wetland features, as described in **Section 3.3.2**.

4.1.2.4 Fish and Wildlife Conservation Act, 1997

The provincial FWCA provides protection of wildlife in Ontario including fish, furbearing mammals, game wildlife and specially protected wildlife through regulations for hunting, trapping, and fishing practices. Game and specially protected mammals, birds, reptiles, amphibians, and invertebrates are listed on Schedules 1-11 of the FWCA. Definitions provided for hunting including capturing or harassing wildlife (Section 5) include activities that collect or handle wildlife for inventories or other scientific purposes, or to relocate wildlife out of harm's way (e.g., during construction activities), including individuals and eggs. Sections 7 and 8 also provide protection for nest and eggs of specified bird species including raptors, and dens of bears and furbearing animals, and beaver dams. Under the FWCA, the Minister has the authority to authorize activities that would otherwise be prohibited such as the safe capture of wildlife and removal of nests, dens, and dams, and impose conditions on an authorization.

4.1.3 Municipal

4.1.3.1 Regional Official Plan (2015)

The OP for the Regional Municipality of Waterloo (Region) provides direction on land use within the Region. The Region's OP was approved, with modifications, by the MMAH on June 18, 2015. The new Regional OP replaced the Region's previous Regional Official Policies Plan, which was approved on December 19, 1995. The following schedules were consulted to determine the applicable policy framework:

- Map '3A' (*Urban Area*) identifies the Subject Lands, in its entirety, as within the Urban Area Boundary and within the Designated Greenfield Areas associated with the Urban System. Built-Up Areas are mapped on lands within and outside of the Study Area, south of Millennium Road.
- Map '4' (*Greenlands Network*) identifies Core Environmental Features in the southwest portion of the Subject Lands and on adjacent lands in the northwest portion of the Study Area.



Chapter 7 of the Region's OP speaks to the Region's goals and policies with respect to the Greenlands Network. Section 7.C.1 of the Region's OP provides the following definition of Core Environmental Features:

Core Environmental Features are those environmental features identified as being provincially significant or regionally significant. These features are the most significant elements of the regional landscape in terms of maintaining, protecting, and enhancing biodiversity and important ecological functions. Core Environmental Features are designated as shown on Map 4. The Core Environmental Features designation applies to lands that meet the criteria as:

- (a) Significant Habitat of Endangered or Threatened Species;*
- (b) Provincially Significant Wetlands;*
- (c) Environmentally Sensitive Policy Areas;*
- (d) Significant Woodlands;*
- (e) Environmentally Significant Valley Features; or*
- (f) Significant Areas of Natural and Scientific Interest.*

Significant Woodlands

Policy 7.C.6 states that *Significant Woodlands are areas that meet all of the following criteria:*

- (a) greater than four hectares in size, excluding any adjoining hedgerows;*
- (b) consisting primarily of native species of trees; and*
- (c) meets the criteria of a woodland in accordance with the provisions of the Regional Woodland Conservation By-law.*

The boundary of a Significant Woodland may be more precisely delineated, subject to Policy 7.A.6, to exclude plantations of primarily non-native species, small lobes and projections, and low-quality wooded habitat on the periphery of the feature, the removal of which does not create an adverse environmental impact on the residual woodland.

4.1.3.1.1 Region of Waterloo By-law Number 08-029

By-law No. 08-026 of the Regional Municipality of Waterloo (A By-Law Respecting the Conservation of Trees in Woodlands) was reviewed. Under Part I – Definitions, the By-law states:

1. (q) “woodland” means land that is located within the boundaries of The Regional Municipality of Waterloo that is at least one hectare or more in area with at least:



- (i) 1,000 trees of any size, per hectare;*
 - (ii) 750 trees, measuring over five centimetres in diameter, per hectare;*
 - (iii) 500 trees, measuring over 12 centimetres in diameter, per hectare; or*
 - (iv) 250 trees, measuring over 20 centimetres in diameter, per hectare;*
- but does not include a cultivated fruit or nut orchard or a plantation established for the purpose of producing Christmas trees.*

4.1.3.2 City of Waterloo Official Plan

The OP for the City of Waterloo (City) provides direction on land use within the City. The City of Waterloo Official Plan – Office Consolidation, November 2022 is the most current version of the OP and was reviewed as part of this assessment. The following schedules were consulted to determine the applicable policy framework:

- Schedule 'A' (*Land Use*), Schedule 'A2' (*Employment Areas*), Schedule 'A3' (*Open Space Land Uses*), and Schedule 'A4' (*Natural System*), identify the Subject Lands within an area designated for Business Employment. Parks and Other Green Space, and Natural System are present in the Study Area located at the western limit and continuing west of the Subject Lands.
- Schedule 'A4' (*Natural System*), identifies Core Natural Features present in the Study Area located at the western limit and continuing west of the Subject Lands.
- Schedule 'A5' (*Natural Hazards*) does not identify hazardous lands within the Study Area.
- Schedule 'A6' (*Specific Provision Areas*) identifies the Subject Lands as within Specific Provision Area (SPA) 26 and lands south and east of Millennium Blvd. as within SPA 25.
- Schedule B3 (*Designated Greenfield Areas*) identifies the Subject Lands as within a Designated Greenfield Area and within the Urban Area Boundary. Additional Designated Greenfield Areas and Built-Up Area designations are present within the Study Area.

Section 8.2 of the City's OP outlines the City's policy direction with respect to Natural Heritage. The following sections outlines policies relevant to the Project.

Section 8.2.2 outlines policies for lands that fall within the *Natural System*. Policy 8.2.11.1 and 8.2.11.2 outline EIS requirements to support proposed development projects within the *Natural System*:

The need for, scope, and acceptability of an Environmental Impact Statement will be determined collaboratively by the Province, the Region, the City, and the Grand River Conservation Authority, and led by:

- (a) the Province, for development or site alteration potentially affecting Significant Habitat of Endangered or Threatened Species;*



- (b) the Region, for development or site alteration potentially affecting Landscape Level Systems (not including Significant Valleys), Core Natural Features, and Environmentally Significant Discharge Areas or Environmentally Significant Recharge Areas that sustain Core Natural Features;*
- (c) the Grand River Conservation Authority for Significant Valleys, Provincially Significant Wetlands located outside Environmentally Sensitive Policy Areas, Locally Significant Wetlands, Other Wetlands, and Perennial Watercourses and Intermittent Watercourses;*
- (d) the City for development or site alteration potentially affecting Supporting Natural Features; and,*
- (e) Fisheries and Oceans Canada, or its delegate, for fish habitat.*

Core Natural Features

Under Policy 8.2.4 (1), *Core Natural Features* are those natural features identified as being provincially or regionally significant. These features are the most significant elements of the regional landscape in terms of protecting and enhancing biodiversity and ecological functions. Core Natural Features are identified by the Region in the Regional Official Plan and are shown on Schedule 'A4' – Natural System. Core Natural Features include:

- (a) Significant Habitat of Endangered or Threatened Species;*
- (b) Provincially Significant Wetlands;*
- (c) Environmentally Sensitive Policy Areas;*
- (d) Regionally Significant Woodlands (defined as Significant Woodlands in the Regional Official Plan); and,*
- (e) Environmentally Significant Valley Features.*

Core Natural Features are mapped on and adjacent (west) of the Subject Lands. Project conformity with the City's OP is discussed in Section 9.3.

Policy 8.2.4 (4) states:

Any development or site alteration proposed in accordance with policy 8.2.4(3) will require the submission of an Environmental Impact Statement or other appropriate study accepted by the City and the other public agencies having jurisdiction, in accordance with Section 8.2.11, to determine the mitigation measures to be implemented, as appropriate, through the development application review process.



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Policy 8.2.4 (5) states:

Development or site alteration will only be permitted on lands contiguous to Core Natural Features if it is demonstrated through an Environmental Impact Statement or other appropriate study accepted by the City and the other public agencies having jurisdiction, in accordance with Section 8.2.11, that there will be no adverse environmental impacts on the feature or its ecological functions.

Woodlands

Locally Significant Woodlands are defined by the City as “Woodlands that are 1 hectare or greater in size, generally excluding adjoining hedgerows and treed areas on small individual lots, that consist primarily of native tree species, which do not meet the criteria of a Regionally Significant Woodland. Cultivated fruit or nut orchards, actively managed plantations, or plantations established for the purpose of producing Christmas Trees or nursery stock are not included.”

Supporting Natural Features – Significant Wildlife Habitat and Wetlands

Policy 8.2.5 relates to Supporting Natural Features, whereby they are defined as:

those natural features not meeting the criteria for provincial or regional significance (i.e. designation as Landscape Level Systems or Core Natural Features) but which are locally significant. These features are the most significant elements of the local landscape in terms of protecting and enhancing ecological functions. Supporting Natural Features are identified by the City and are shown on Schedule ‘A4’ – Natural System.

Locally Significant Wetlands are defined by the City as “Wetlands that are naturally-occurring and 0.5 hectares or greater in size or anthropogenic in origin and 2 hectares or greater in size, which are not classified as Provincially Significant Wetlands.”

Other Wetlands are defined by the City as “Wetlands that are naturally-occurring and less than 0.5 hectares in size or anthropogenic in origin and less than 2 hectares in size, which are not classified as Provincially Significant Wetlands.”

Setbacks to Natural Heritage Features

Policies 8.2.4 (6) state that an Environmental Impact Statement shall be submitted and will identify appropriate buffers for Core Natural Features, to the satisfaction of the City and the other public agencies having jurisdiction.

Such buffers will serve to protect Core Natural Features from adverse environmental impacts and, where feasible, enhance or restore Core Natural Features and their ecological functions. The location, width, composition, and use of buffers will be in accordance with the accepted Environmental Impact Statement, with buffers being measured from the outside boundary of the Core Natural Feature and established and maintained primarily as appropriate self-sustaining and undisturbed native vegetation.



Policies 8.2.4 (7) states that “notwithstanding policy 8.2.4(6), the buffer width for Core Natural Features will be a minimum width of 10 metres in accordance with the Regional Official Plan”.

Setbacks to Supporting Natural Features

Policy 8.2.5 (7) outlines buffer width guidelines for Supporting “A” Natural Features, including Locally Significant Wetlands. Fifteen meters are proposed as the guideline setback for *Locally Significant Wetlands*.

Policy 8.2.5 (17) concerns supporting “B” natural features, including Other Wetlands and states: “Development and site alteration will avoid Supporting “B” Natural Features wherever feasible...”

Policy 8.2.5 (23) states:

Where the form of an Other Wetland or Other Woodland is to be maintained or relocated through development or site alteration, in part or in whole, an appropriate buffer width will be determined through an Environmental Impact Statement or other appropriate study accepted by the City and the other public agencies having jurisdiction, in accordance with Section 8.2.11.

Policy 8.2.11 relates to the requirement of an Environmental Impact Statement.

4.2 Physical Geography and Landscape Ecology

The Study Area is located in the Grand River Watershed and a tributary to the Grand River begins on the eastern edge of the Subject Lands and flows east towards the Grand River. The Study Area is located within the physiographic region defined by Chapman and Putnam (2007) as the Oxford Till Plain. The Oxford Till Plain in this area is characterized by drumlinized till plains consisting of sands and silts. Spillways associated with the Grand River are located to the west, north, and east of the Subject Lands.

The Study Area is located within the Huron - Ontario Section of the Great Lakes - St. Lawrence Forest Region (Rowe 1972) and within Ecoregion 6E: Lake Simcoe-Rideau Ecoregion (MNR 2023). Forest communities in this Ecoregion are dominated by American Beech and Sugar Maple with associates of Basswood, White Ash, Red Ash, Yellow Birch, Red Maple, and oaks including Red Oak, White Oak and Bur Oak. Eastern Hemlock, Eastern White Pine, and Balsam Fir, Blue-beech, Silver Maple, and elms including Slippery Elm and Rock Elm also occur frequently throughout this Ecoregion. Black Ash and Eastern White Cedar are known to occur in river-bottom and swamp sites.

The Study Area is located in the Stratford Ecodistrict (6E-1). This Ecodistrict is characterized predominately of fine-textured, calcareous morainal deposits. Approximately 80% of the area within the Ecodistrict has been converted to pasture and cropland. Scattered deciduous forests occupy about 13% of natural land cover within the Ecodistrict. Mixed and coniferous forests, marshes, bogs, and fens occupy 3% of natural land cover within the Ecodistrict (Wester et al. 2018).



4.3 Designated Natural Heritage Features and Areas

Based on the results of the background review, the following natural heritage features and areas have been previously identified in the Study Area:

- Wetlands – An unevaluated wetland is located in the Study Area in the woodlot west of the Subject Lands (LIO, 2023). A PSW (Waterloo Rural East Wetland) is located outside (south-east) of the Study Area (see **Figure 2, Appendix A** for details). Further evaluation of the wetland has been completed, see **Section 4.7.2** for details).
- Significant Woodlands – provincial records show woodlands (Wooded Areas) in the Study Area, west of the Subject Lands (see **Figure 2, Appendix A** for details). Schedule A4 of the City OP and Map 4 of the Regional OP identify woodlands within the Study Area as “Core Natural Features” and “Core Environmental Features”, respectively. This woodland feature has been previously identified as Significant Woodlands (Stantec 2008).
- Significant Wildlife Habitat – Breeding Amphibian Significant Wildlife Habitat (SWH) was previously confirmed by Stantec (Stantec 2008) in the Study Area associated with the woodland/wetland habitat present west of the agricultural field (where developments are proposed) on the Subject Lands.
- O. Reg 41/24 Regulated Areas – Wetlands and watercourses in the Study Area are regulated by the GRCA under O. Reg. 41/24 of the CAA (see **Figure 2, Appendix A** for details).

No other natural heritage features or areas, as defined by the PPS, have been previously identified in the Study Area.

4.4 Terrestrial Resources

4.4.1 Vegetation communities

Agricultural row crops, meadow, thicket, and wetland habitat were identified on or directly adjacent to the Subject Lands. The Subject Lands are predominantly established with annual row crops under active agriculture (OAGM1). The remainder of the Subject Lands (approximately 0.5 ha) are established with forb and mixed meadows (MEMM4 and MEFM4), and Sandbar Willow Deciduous Thicket (THDM5-a) communities. Sugar Maple - Hardwood Deciduous Forest (FODM6-5) and Silver Maple Deciduous Swamp (SWDM3-2) communities are present in the Study Area, west of the Subject Lands. A Common Reed Mineral Shallow Marsh (MASM1-12) inclusion community (0.02 ha) is present at the south-east corner of the Sugar Maple Deciduous Forest, just north of the pedestrian sidewalk present along Millennium Blvd.

Descriptions of vegetation communities present in the Study Area are in Table 4-1 below. Vegetation communities located within the Study Area are shown in **Figure 3, Appendix A**.



Table 4-1 ELC Communities Present in the Study Area

ELC Code	Community Type	Community Description	Total Area in Study Area (ha)	S-Rank
Agricultural Communities				
OAGM1	Annual Row Crops	54% of the Study Area is established with agricultural lands. Annual row crops were observed to be established with Common Wheat at the time of the field program.	21.80	-
Meadow Communities				
MEMM4	Fresh - Moist Mixed Meadow	This community is located at the south end of the Subject Lands, north of Millennium Blvd and pedestrian sidewalk. This community was dominated by Smooth Bedstraw, Smooth Brome, Kentucky Bluegrass intermixed with Common Teasel, Canada Thistle, Canada Goldenrod, Wild Carrot, and Black Medic.	0.39	-
MEFM4 (inclusion to MEMM4)	Fresh - Moist Forb Meadow	This community is an inclusion in the MEMM4 community. This community was dominated by Creeping Buttercup with a few individuals of Canada Goldenrod and Narrow-leaved Cattail.	0.01	-
MEMM3	Dry - Fresh Mixed Meadow	This community is located at the north-west end of the Study Area. This community is dominated by members of the Asteraceae family with associates of Wild Carrot, Chicory, Reed Canary Grass, Field Bindweed and Red Clover.	1.26	-
Forest Communities				
FODM6-5	Fresh – Moist Sugar Maple – Hardwood Deciduous Forest	Located at the west end of the Study Area, this community's canopy was dominated by Sugar Maple with associates of White Elm, Red Ash, American Basswood, Northern Red Oak, American Beech, Black Cherry, and Eastern Hop-hornbeam. The understory was established with White Trillium, Trout-Lily, Early Meadow-rue, Red Baneberry, Zigzag Goldenrod, Small Enchanter's Nightshade, Poison Ivy, Thicket Creeper, May-apple, Wild Strawberry, and Wood Nettle.	2.6	S5
Swamp Communities				
SWDM3-2	Silver Maple Mineral Deciduous Swamp	This community is located in the approximate centre of the FODM6-5 community. Silver Maple dominated the canopy layer, with associates of Red Maple, Red Ash, and occasional White Elm. The subcanopy and groundcover was dominated by Small-spike False Nettle, Spotted Jewelweed, and occasional Sensitive Fern.	0.85	S5



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ELC Code	Community Type	Community Description	Total Area in Study Area (ha)	S-Rank
Marsh Communities				
MASM1-12 (inclusion to FODM6-5)	Common Reed Mineral Shallow Marsh	This community is located at the west-south corner of the Study Area. This community is dominated by Common Reed with scattered Narrow-leaved Cattail, Red-osier Dogwood and Silver Maple. It is anticipated this inclusion wetland was created by changed drainage associated with the development of Millennium Boulevard; associated with the roadside ditch.	0.02	S4
Thicket Communities				
THDM5-a (inclusion to MEMM4)	Fresh-Moist Sandbar Willow Deciduous Thicket	This community is located at the south end of the Subject Lands, north of Millennium Blvd and pedestrian sidewalk. This community is dominated by Sandbar Willow with scattered Carolina Poplar.	0.13	-
Constructed Communities				
CVR, CVR-4, CGL-4, CVC, CV1-1	Residential, Rural Residential, Recreation, Commercial / Industrial, transportation	These constructed communities are located in the Study Area, outside of the Subject Lands and include various property developments and public infrastructure.	13.41	-

No rare communities (S1-S3) were observed in the Study Area; all communities observed in the Study Area are common to very common throughout Ontario.

4.4.2 Flora

A list of vascular plant species documented during the botanical the field program is located in **Appendix C**. One-hundred and forty-nine (149) vascular plants were recorded in the Study Area. Of these species, 91 (65%) were native and 50 (35%) were non-native species. All of the native plants documented had a provincial rank of S4 or S5, indicating they are common in Ontario. Four sensitive plant species (CC = 8-10) were documented during the botanical inventory. These four species (Hobblebush, White Trout-lily, Gray's Sedge and Heart-leaved Willow) are also regionally significant species. An additional two regionally significant species was observed during the field program (Summer Grape and Yellow-seed False Pimpernel). These six species were observed in the woodlot/swamp present in the Study Area, located west of the agricultural field (where developments are proposed) on the Subject Lands.



4.4.3 Avifauna

A total of 58 avifauna species were recorded within or near the Study Area based on the results of the background review (**Section 3.2**) and Stantec's 2023 field program (**Section 3.3**). Species recorded and associated conservation status are provided in **Appendix D.1**. Of these species, 54 (93%) were native and 4 (7%) were non-native species. Four SAR and 18 SOCC species were recorded for the area. These species were included in the SAR and SOCC Habitat Screening Assessments, see **Section 4.6** for details.

Breeding Bird Survey Results

A total of 32 bird species were recorded during the 2023 field program which included breeding bird point-counts and transect surveys, as well as incidental observations. Locations of the five point-count locations are shown in **Figure 3, Appendix A**.

Eastern Wood-Pewee was observed in the woodlot at the southwest end of the Study Area. This species was observed at Breeding Bird Station (BBS) -1 and BBS-2 and was observed during all three-breeding bird survey site visits. Two individuals were observed; it is anticipated that these individuals are a breeding pair. Eastern Wood-Pewee are listed as Special Concern (SC) under the ESA, under schedule 1 of SARA, and have a provincial S-Rank of S4B (apparently secure).

Three regionally rare species (Willow Flycatcher, Red-bellied Woodpecker, and Great Blue Heron) were observed in the Study Area during the 2023 field program. Willow Flycatcher was observed south-west of BBS-2 during the third survey (June 20, 2023) at the southern end of the woodlot west of the Subject Lands. Red-bellied Woodpecker was observed south-east of BBS-2 during the first survey (May 25, 2023) in the central woodlands / swamp community located west of the Subject Lands. Several Great Blue Heron flyovers were observed throughout the field program. It is anticipated that this species is utilizing the storm water management pond located west of the Study Area and/or the PSW located east of the Study Area.

All other native bird species observed in the Study Area have S-Ranks of S4 (apparently secure) or S5 (secure) and are common and widespread in southern Ontario.

4.4.4 Herpetofauna

A total of 22 herpetofauna species were recorded within or near the Study Area based on the results of the background review (**Section 3.2**) and Stantec's 2023 field program (**Section 3.3**). All species are native to Ontario. One SAR and five SOCC species were recorded for the area. These species were included in the SAR and SOCC Habitat Screening Assessments, see **Section 4.6** for details.



4.4.5 Mammals

Nine mammalian species were recorded within or near the Study Area based on the results of the wildlife records review; previous site documentation including Stantec's 2007 field program, as detailed in **Section 3.2**, and Stantec 2023 field program, as detailed in **Section 3.2** and **Section 3.3**. Four SAR bat species were among the records. These species were included in the SAR Habitat Screening Assessments, see **Section 4.6.1** for details. No SOCC species or Regionally Significant species were observed or recorded within or near the Study Area.

4.4.6 Insects

A total of 124 insect (Lepidoptera and Odonata) species were recorded within or near the Study Area based on the results of the wildlife records review and Stantec 2023 field program, as detailed in **Section 3.2** and **Section 3.3**. Of these species, 117 (94%) were native and 7 (6%) were non-native species. No regionally significant species were recorded. One SAR species and five SOCC species were recorded for the area. These species were included in the SAR and SOCC Habitat Screening Assessments, see **Section 4.6** for details.

4.4.7 Incidental Wildlife Observations

Incidental wildlife observations during the 2007 and 2023 field programs completed for the Study Area included Raccoon, Grey Squirrel, Eastern Chipmunk, Eastern Cottontail, White-tailed Deer, Killdeer, Wild Turkey, and Eastern Wood-Pewee. Eastern Wood-Pewee, a SOCC, was observed on June 8, 2023, after the second breeding bird survey (see **Section 4.4.3** for details). All other incidental species observed are common and secure in Ontario, with no provincial designation.

4.5 Aquatic Resources

4.5.1 Fish and Fish Habitat / Headwater Drainage Features

The Study Area is on a watershed divide with the majority of the Subject Lands draining southeast to Horst Creek and the remaining portions of the Subject Lands draining south to Critter Creek. Both Horst Creek and Critter Creek drain to the Grand River. There are no mapped surface water features or constructed drains within the Study Area. There are no records for aquatic SAR or their critical habitat mapped within the Study Area (DFO 2023, MNRF 2023). The Subject Lands are located within the jurisdiction of the GRCA.



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The first HDF field investigation (in March) determined the presence of four HDFs near the forested area at the western side of the Study Area. Each of these features contained a small to moderate amount of standing water, with no visible flow path. Typically, the presence of standing water only would not require a second field investigation; however, a small amount of precipitation occurred prior to the first investigation. All features were dry, with minimal evidence of water retention (i.e., reduced crop growth), during the second visit (in May). All features contain water for a very short period of time following spring freshet and contribute this short pulse of flow to the woodlot. Only the reaches of the HDFs outside of the woodlot were provided with management recommendations, as any continuance of the drainage inside the woodlot will be retained with the protection of that feature.

Following the guidelines (TRCA & CVC 2014), the data and observations collected from site visits were used to inform a series of classifications of each feature in relation to its function with respect to hydrology, riparian character, fish and fish habitat, and terrestrial habitat. These classifications were then used to navigate a flow chart that determines the most appropriate management approach for the feature. Management approaches can range from protection in situ to no management required (i.e., removal is possible), with interim management approaches that include replication of form and/or function. Each of the HDFs are shown on **Figure 3 (Appendix A)** and are described in **Table 4-2** with recommended management outcomes per the guidelines (TRCA & CVC 2014).

Table 4-2 Summary of Functional Classifications as per HDF Guidelines (TRCA & CVC 2014)

Drainage Feature	Hydrology (modifiers)	Riparian¹	Fish Habitat²	Terrestrial Habitat	Management Outcome
HDF-1	Limited (cropped throughout)	Limited	Not Applicable	Limited	No Mitigation Required
HDF-2	Limited (cropped throughout)	Limited	Not Applicable	Limited	No Mitigation Required
HDF-3	Limited (cropped throughout)	Limited	Not Applicable	Limited	No Mitigation Required
HDF-4	Limited (cropped throughout)	Limited	Not Applicable	Limited	No Mitigation Required

¹ Riparian Classification was assessed for only the reach within the agricultural field.

² Fish Habitat Classification is not applicable as there is no connection to a downstream watercourse or fish habitat feature.

No fish habitat is present on site. The headwater drainage features are ephemeral and do not contribute to downstream fish habitat, as drainage is limited, localized, and disconnected.

4.6 Species at Risk and Species of Conservation Concern Habitat Screening Assessments

Habitat screenings for SAR and SOCC were completed for the Study Area using the methodology detailed in **Section 3.4.1**. The full results of the assessment are provided in **Appendix E**.



4.6.1 Species at Risk

The results of the assessment determined that the following SAR have a medium probability of occurring in the Study Area:

- Blanding's Turtle
- Little Brown Myotis
- Eastern Small-footed Myotis
- Northern Myotis
- Tri-colored Bat

Turtle surveys were not completed as part of the 2008 or 2023 assessments. Potential Blanding's Turtle habitat was observed associated with wetlands located west (pond west of woodlands) and north-east (PSW) of the Study Area. Blanding's Turtle may also utilize the woodlot and swamp habitat in the woodland feature located west of the Subject Lands.

Potential habitat for SAR bats (Little Brown Myotis, Eastern Small-footed Myotis, Northern Myotis, and Tri-colored Bat) was observed associated with the woodland feature located west of the Subject Lands. Acoustic recording units for the purpose of assessing species presence was not completed as part of the assessment as developments were not proposed in the woodland or wetland features.

The results of the assessment concluded that the remainder of the SAR species previously documented in or near the Study Area were absent or had a low probability of occurring on the Subject Lands and Study Area.

4.6.2 Species of Conservation Concern

Three regionally rare species (Willow Flycatcher, Red-bellied Woodpecker, and Great Blue Heron) were observed in the Study Area during the 2023 field program. Willow Flycatcher was observed south-west of BBS-2 during the third survey (June 20, 2023) at the southern end of the woodlot west of the Subject Lands. Red-bellied Woodpecker was observed south-east of BBS-2 during the first survey (May 25, 2023) in the central woodlands / swamp community located west of the Subject Lands. Several Great Blue Heron flyovers were observed throughout the field program. It is anticipated that this species is utilizing the storm water management pond located west of the Study Area and/or the PSW located east of the Study Area.

An additional SOCC species was confirmed in the Study Area. Eastern Wood-Pewee was observed in the woodlot at the southwest end of the Study Area. This species was observed at BBS-1 and BBS-2 and was observed during all three-breeding bird survey site visits. Two individuals were observed; it is anticipated that these individuals are a breeding pair. Eastern Wood-Pewee are listed as Special Concern (SC) under the ESA, under schedule 1 of SARA, and have a provincial S-Rank of S4B (apparently secure).



4 Results

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In addition to the confirmed SOCC habitat findings described above, the results of the SOCC Screening Assessment (**Appendix E**) concluded that the following SOCC have a high or medium probability of occurring in the Study Area:

- Pileated Woodpecker
- Hairy Woodpecker
- Western Chorus Frog
- Milksnake
- Monarch
- Betrothed Underwing Moth
- Little Underwing Moth
- Oldwife Underwing Moth
- Penitent Underwing Moth
- Tawny Emperor
- Scarlet Beebalm

Two large diameter (>50 cm DBH) snags with several Pileated Woodpecker roosting and feeding cavities were observed within the woodland located west of the Subject Lands. Specifically, this habitat was observed approximately 1.5m past the feature dripline at the south end of the woodland feature, just north of the wetland inclusion (MASM1-12).

Reptile and amphibian surveys were not completed as part of the 2023 field program. Potential Western Chorus Frog and Milksnake habitat was observed associated with the woodlands and wetlands located west of the Subject Lands and north-east (PSW) of the Study Area.

Insect surveys were not completed as part of the 2023 field program. Potential habitat for Betrothed Underwing Moth, Little Underwing Moth, Oldwife Underwing Moth, Penitent Underwing Moth, and Tawny Emperor is present associated with the woodlands and swamps west of the Subject Lands. Substantive milkweed populations / Monarch habitat on the Subject Lands was not observed. Potential Monarch habitat is present in meadows in the larger Study Area.

Scarlet Beebalm habitat was observed in the woodlands at the west end of the Study Area. The species was not observed during the field program, noting that floral inventory efforts focused on the eastern half of the woodlot. A portion of the woodlot is located outside of the Study Area (greater than 120m from the Subject Lands); a comprehensive floral inventory was not completed for this area.

The results of the assessment determined that the remainder of the SOCC species previously documented in or near the Study Area were absent or had a low probability of occurring on the Subject Lands and in the Study Area.



4.7 Significance Assessments

4.7.1 Woodlands

The woodlands have been mapped by the Region as Core Environmental Features, whereby Core Environmental Features are defined as “those environmental features identified as being provincially significant or regionally significant.” The woodlands have been mapped by the City as Core Natural Feature with reference to the Region’s OP and mapped on Schedule ‘A4’.

Greater than 6 ha of woodlands are present west of the agricultural field on the Subject Lands. The woodlands are established with primarily native tree species. A full tree inventory for the trees within the woodlands was not completed as part of the assessment, however, based on field observations and GIS techniques, it is anticipated that the woodlands would meet the criteria of a woodland in accordance with the provisions of the Regional Woodland Conservation By-law.

It is Stantec’s opinion, that the woodlands west of the agricultural field (where developments are proposed) on Subject Lands meet the City and Region’s criteria for Significant Woodlands (see **Section 4.1.3** for criteria details).

4.7.2 Wetlands

The wetlands in the Study Area are located within the woodland feature designated as Core Natural Feature, west of the Subject Lands. The main wetland feature (Silver Maple Mineral Deciduous Swamp), which has not been classified as a PSW, is considered naturally occurring and is greater than 0.5 hectares. This wetland feature meets the definition of Locally Significant.

The smaller Common Reed dominated feature (0.02ha) has been identified as “Other Wetland” in accordance with the City’s OP, see Section 4.1.3.2 for details. This feature is located at the intersect of the woodlands and the manicured grass areas adjacent to the pedestrian walkway to the south.

4.7.3 Significant Wildlife Habitat Screening Assessment

The following sub-sections identify candidate and confirmed SWH within the Study Area. SWH, including habitats for SOCC receive protection under the PPS. SOCC may also be afforded protection under the MBCA or Ontario *Fish and Wildlife Conservation Act* (1997).

A SWH screening assessment for the Study Area is provided in **Appendix F**. A habitat screening for SOCC was completed for the Study Area and is provided in **Appendix E**. The results of the assessment are outlined below. Where a medium or high probability for SWH in the Study Area has been concluded, the SWH is considered Candidate SWH. Specifically, Candidate SWH refers to potential habitats that may meet the habitat criteria but have not been confirmed through additional detailed studies.

Confirmed SWH includes the following features:



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Amphibian Breeding Habitat (Woodland and Wetland SWH)

Amphibian breeding habitat was observed in the Study Area associated with the deciduous woodlands and swamp located west of the Subject Lands (Stantec 2008).

Special Concern and Rare Wildlife Species

Eastern Wood-Pewee was observed in the woodlot at the southwest end of the Study Area. This species was observed at survey stations BBS-1 and BBS-2 and was observed during all three-breeding bird survey site visits. Two individuals were observed; it is anticipated that these individuals are a breeding pair. Eastern Wood-Pewee are listed as Special Concern (SC) under the ESA, under schedule 1 of SARA, and have a provincial S-Rank of S4B (apparently secure). This species receives protection under the MBCA. There is also additional potential SOCC habitat associated with the woodland feature for Pileated Woodpecker, Hairy Woodpecker, Western Chorus Frog, Milksnake, Betrothed Underwing Moth, Little Underwing Moth, Oldwife Underwing Moth, Penitent Underwing Moth, Tawny Emperor, and Scarlet Beebalm.

Terrestrial Crayfish

Terrestrial crayfish habitat was observed in the Study Area associated with the wetlands located west of the Subject Lands.

Candidate SWH includes the following features:

Bat Maternity Colonies

Potential bat maternity colonies habitat was identified in the Study Area associated with the treed area (woodlands and swamp) located west of the Subject Lands.



5 Proposed Development

The proposed plan of subdivision for the Subject Lands, and grading plans are provided in **Appendix G** and are shown in **Figure 4 (Appendix A)**. The proposed plan of subdivision comprises of a mix of residential blocks, a park block, a stormwater management block, and one commercial block.

Water quantity and water quality control for the majority of the site drainage area will be provided by an end-of-pipe wet pond Stormwater Management Facility (SWMF). The proposed SWMF is designed to provide enhanced (formerly Level 1) level of water quality control (80% TSS removal efficiency) through the inclusion of permanent pool and extended detention storage as well as a single sediment forebay, sized per the requirements of the SWMPD Manual (MOE, 2003). The onsite SWMF is designed to control all storm events up to and including the 100-year from the contributing area. As a provision, overflows from the SWMF spillway will be conveyed overland through the existing road right-of-way to the existing constructed wetland (SWMF B) approximately 700m to the east of the site as described in the Carriage Crossing Subdivision Final Stormwater Management Report (CCFSWM) (Stantec, 2010).

A portion of the site drainage is directed uncontrolled to the wetland. The contributing area consists of pervious or “clean” sources (rear yards, rooftops, green spaces, etc.) and thus do not require water quality control (Stantec 2024b). It was determined through the environmental and hydrogeological investigations that the wetland southwest of the site is primarily supplied with surface water rather than groundwater. As a result, the area draining to the wetland has been sized accordingly to convey a similar amount of runoff to the wetland as in existing conditions. Peak flow attenuation is inherently provided for the wetland with the reduction of the contributing drainage area (Stantec 2024b).

Grading to support servicing infrastructure is generally confined to the block plan footprints. Minor grading is proposed in the 10 m setback (vegetation protection zone) from the Significant Woodlands. A stormwater outlet is also proposed in the 10m setback. Potential impacts to the woodland and wetland features west of the existing agricultural field are addressed in the impact assessment (See **Section 6** for details).

The design integration includes several residential blocks that provide for a mix and range of unit types. Taller, high-density housing is planned adjacent to Millennium Boulevard located in the southern portion of the plan, while lower-rise housing is proposed in the northern portion of the plan.

A network of local streets and sidewalks in a modified grid pattern is proposed to connect the proposed subdivision to Millennium Boulevard and the community. This includes extending Crossgate Boulevard at the Millennium Boulevard and Crossgate roundabout. This would serve as the primary entry to the subdivision. Two additional streets are proposed that align with existing streets to the south; this would include expanding Park Road and Oak Park drive.



6 Impact Assessment

A hydrogeological assessment was completed by Stantec and included in Appendix G (Stantec 2024a). Groundwater flow direction is from the northwest to the southeast away from the natural heritage feature and wetland towards Millennium Boulevard. The direction of groundwater flow indicates that the proposed development of the Subject Lands is not expected to have an impact on pre-existing groundwater flow that may sustain the wetland feature west of the agricultural field (Stantec 2024a).

A review of the FSR&SWM report (Stantec 2024b) determined that the wetland west of the agricultural field is primarily surface water fed and acts as a groundwater recharge feature. The proposed development does not include underground parking and is not anticipated to impeded groundwater flows to features located east of the Subject Lands. Groundwater on the Subject Lands flows from northwest to southeast, away from the wetland; thus, infiltration from the proposed development area does not enter the wetland.

A monthly water balance analysis was conducted using the Thornthwaite and Mather method, for both the overall site and for the offsite wetland. The soils across the site are not anticipated to change from the existing to the proposed condition, therefore, the area, land use and vegetation cover are the only changing parameters in the calculations. The runoff from the existing conditions wetland-contributing catchment corresponds to catchment 102 in the existing conditions and catchment 201 in the proposed conditions. Site-wide conditions refer to flows from the entire proposed development area. The Functional Servicing Plan and Stormwater Management Report further detail the results of monthly and annual groundwater recharge and runoff calculations.

The purpose of the water balance analysis was to account for surface runoff volumes directed to the adjacent wetland (west) from the development lands. Stantec has confirmed they are within 10% of the existing annual runoff rates to support continued wetland function (Stantec 2024b).

The results of the ecological surveys including the woodland and wetland vegetation community composition determined a high presence of species that can dominate both wetland and terrestrial ecosystems as per OWES, see Section 4.4.1 and 4.4.2 and associated floral inventory provided in Appendix C for details. The dominant plants occurring in the natural heritage feature located west of the agricultural field and their associated hydro-tolerance are listed in Table 6-1. The Coefficient of Wetness is published by the province and is publicly available (MNR 2025). The Coefficient of Wetness reflects a species' affinity for wet soil conditions and ranges from -5 to 5; whereby a ranking of -5 is considered an obligate wetland species and 5 is considered an obligate upland species.

Table 6-1 Hydro-tolerance of Dominant Canopy and Groundcover Species in NHS

Species	Wetness Coefficient	Wetland Indicator (OWES 2022)
Sugar Maple	3	No
Silver Maple	-3	Yes
Red Maple	0	No



Species	Wetness Coefficient	Wetland Indicator (OWES 2022)
White Elm	-3	No
Red Ash	-3	No
American Basswood	3	No
Northern Red Oak	3	No
American Beech	3	No
Black Cherry	3	No
Eastern Hop-hornbeam	3	No
White Trillium	3	No
Trout-Lily	3	No
Early Meadow-rue	3	No
Red Baneberry	3	No
Zigzag Goldenrod	3	No
Small Enchanter's Nightshade	-3	Yes
Thicket Creeper	3	No
May-apple	3	No
Wild Strawberry	3	No
Wood Nettle	-3	No
Small-spike False Nettle	-5	Yes
Spotted Jewelweed	-3	Yes
Sensitive Fern	-3	Yes

Based on these results, with the exception of Small-spike False Nettle, all dominant species observed in the natural heritage feature located west the existing agricultural field exhibit a relatively high tolerance to changing soil moisture regimes.

No SAR plants were observed in the Study Area. The SOCC plants observed in the natural heritage feature west of the agricultural field and their Wetness Coefficients (in brackets) are as follows: Hobblebush (0), White Trout-lily (3), Gray's Sedge (-3), Heart-leaved Willow (0), Summer Grape (3) and Yellow-seed False Pimpernel (-5). Gray's Sedge and pimpernels (*Lindernia* sp.) are listed under OWES as wetland indicator species.

Given that drainage is being directed towards the existing wetland feature west of the agricultural field, if a change occurs, it is expected that the change in soil moisture regime in the natural heritage feature is more likely to create slightly wetter conditions, rather than drier conditions. Based on the results of the water balance calculations (within 10% of the existing annual runoff rates) and analysis of species hydro-tolerance, it is Stantec's opinion that the proposed development is not anticipated to have a negative impact on the natural heritage feature or it's ecological functions.

The development proposal includes direct loss of vegetation, which has the potential to provide habitat for urban tolerant wildlife such as breeding birds and mammals documented during field investigations.



Potential direct and indirect effects to vegetation and wildlife are discussed below, including recommendations for standard and site-specific mitigation.

6.1 Direct Impacts

The proposed development will result in a permanent direct loss of 14.71 ha of agricultural land (OAGM1), 0.38 ha of meadow habitat (MEFM4 and MEMM4), and 0.13 ha of deciduous thicket (THDM5-a) on the Subject Lands (see **Figures 3 and 4, Appendix A** for details). The results of the assessment (**Section 4.4 and 4.5**) have determined that these features provide habitat for urban tolerant terrestrial species; no aquatic features are present within the Study Area.

The proposed development is likely to result in an increase in artificial light at night (ALAN), which can impact the circadian rhythms of the wildlife inhabiting the woodlands west of the Subject Lands. Mitigation is proposed, see **Section 6.3** for details.

Stantec reviewed an updated hydrogeological assessment entitled “Hydrogeological Technical Memorandum, Supplementary Groundwater Monitoring and Wetland Assessment, Carriage Crossing Subdivision (400 Millennium Boulevard), Blocks 320 and 326 (Registered Plan 58M-506), Waterloo Ontario” (Stantec 2024a). The results indicate that future development of the Subject Lands will not have a hydrogeological impact on the wetland located immediately to the southwest of the Subject Property, given that groundwater flows from the northwest to southeast away from this wetland and through the subsurface of the Subject Lands. These results indicate that the future development of the Subject Property will not have an impact on existing groundwater flows that may sustain the wetland, given that these potential groundwater inputs originate from the lands to the northwest of the Subject Property. The Functional Servicing and Stormwater Management Report (FSR/SWM) (Stantec 2023b) was also reviewed, with this report indicating the wetland is primarily supplied with surface water (runoff). As such, the area of the Subject Property draining to the wetland under the proposed post-development condition has been sized accordingly to convey to match the amount of runoff that is directed to the wetland under the pre-development (existing) condition. Peak flow attenuation is inherently provided for the wetland with the reduction of contributing drainage area. Copies of Stantec’s hydrogeological investigation and FSR/SWM report are included in the application submission.

For the PSW (Waterloo Rural East Wetland) that is located to the east of the Subject Lands, mapping available from the GRCA (**Figure H.1, Appendix H**) indicates that upward vertical gradients are not present beneath the wetland, which suggests that this feature is not characterized by groundwater discharge conditions. As a result, any loss of infiltration potential across the Subject Lands and subsequent groundwater flow towards the PSW from these lands will not affect the existing form and/or hydrogeological function of this wetland.

Under existing conditions, most runoff from the Subject Lands that discharges to the PSW occurs via an existing outfall. A SWM facility that will be constructed on the Subject Lands is proposed to attenuate peak flows to pre-development levels to this PSW. As the PSW has a positive outlet to Horst Creek downstream, the increased post-development runoff volumes are not likely to impact the hydrologic function of the PSW.



6.2 Temporary Impacts

Stantec reviewed the proposed grading plan to support infrastructure development on the Subject Property and in the Study Area; a copy of the grading plan is provided in **Appendix G**. Grading is proposed in the outer (eastern) edge of the 10m setback (buffer / vegetation protection zone) to the Significant Woodlands located directly west of the agricultural field (where developments are proposed) on the Subject Lands. The buffer is currently under active agriculture (corn crops). Grading impacts will be limited to the construction phase of the Project. The buffer will be revegetated, as appropriate after infrastructure developments are completed. The Edge Management Plan will be prepared under separate cover to support Site Plan Approval.

6.3 Mitigation

Mitigation measures are recommended to protect existing significant natural heritage features, reduce potential effects to features and urban tolerant wildlife, as well as protect migratory birds and bats in the Study Area.

6.3.1 Erosion and Sediment Control

An erosion and sediment control (ESC) strategy will be developed during detailed design and implemented throughout the construction process in order to mitigate the potential for off-site discharge of sediment into receiving features and the associated negative environmental impacts. A monitoring and maintenance program will also be developed during detailed design to ensure continued SWM functionality.

6.3.2 Setbacks to Natural Heritage Features

There are no aquatic features present within the Study Area requiring mitigation and/or compensation. Woodlands and wetlands have been identified in the Study Area. The woodlands are considered Regionally Significant Woodlands and the main wetland feature (Silver Maple Mineral Deciduous Swamp) is considered a Locally Significant Wetland in accordance with the City's OP. Further, the results of the SAR, SOCC and SWH Screening Assessments (**Sections 4.6 and 4.7.3**) have identified potential SAR bat treed habitat, confirmed and additional candidate SOCC habitat, as well as confirmed and additional candidate SWH associated with the woodlands and wetland features west of the agricultural field (where developments are proposed) on the Subject Lands.

A 10 m setback is proposed from the woodland dripline staked by the Town, Region, and Stantec on June 14, 2023. A 15 m setback is proposed from the wetland dripline staked by the GRCA and Stantec on June 14, 2023 for the locally significant wetland feature. A 10m setback is proposed from the small (0.02ha) Common Reed dominated wetland. This small inclusion unit qualifies as Other Wetland under the City's OP. A copy of the OLS survey is provided in **Appendix G**.



6.3.3 Edge Management Plan / Invasive Species Management

An edge management plan will be prepared by Stantec for the area between the existing woodland dripline and the 10m setback from the woodland dripline. The 15m setback from the main wetland is located behind the 10m setback from the woodland dripline. A 10m setback is proposed from the small (0.02ha) Common Reed dominated wetland. This small inclusion unit qualifies as Other Wetland under the City's OP. Ten meters is considered appropriate as it is well documented that this setback supports reduction in edge effects related to windthrow and the protection of root zones (NPCA, 2022). Further, the 10m edge management plan will support protection and enhancement of the City's Core Natural Feature which includes the Regionally Significant Woodland feature and the Locally Significant Wetland feature, as well as the candidate and confirmed SAR, SOCC and SWH habitat. This restoration work will serve to convert agricultural land to native woodland in an area that is currently actively used for agricultural purposes, representing a net gain of habitat. The species outlined in the edge management plan will all be native to Ontario and will be chosen for ecological congruency with the adjacent feature and support its expansion / additional habitat creation.

An invasive species management plan will be prepared under separate cover at the detailed design / Site Plan Approval stage to support the successful restoration of the buffer, and protection of the main natural heritage features to the west.

6.3.4 Directional Lighting

It is recommended that directional lighting be implemented as part of the design. While it is understood there are safety considerations, where feasible, street and sidewalk / pedestrian walkway lighting should be directed away from the significant natural heritage features (Significant Woodlands and associated habitat) west of proposed developments on the Subject Lands to reduce the effects of ALAN on local wildlife populations.

6.3.5 Homeowner Stewardship

It is recommended that a homeowner stewardship plan be prepared to educate new residents to the neighbourhood on the natural heritage features in the area, with a focus on the ecology of the woodlands/wetlands located west of the proposed development. The plan is recommended to include details concerning ALAN resulting from backyard lighting, pet etiquette (education materials related to the impacts to local ecology related to dogs, cats or otherwise homeowner pets), as well as impacts of developing trails from walking, hiking, bicycling or otherwise use of the woodlands. The educational brochure could include a list of dos and don'ts, such as:

- avoid the use of pesticides and toxic materials
- avoid planting invasive garden species that may escape to natural areas
- consider gardening with native species
- keep cats indoors and dogs leashed where possible to avoid harming or harassing wildlife
- Turn off backyard lights at night when not in use



- Keep to sidewalks and purpose-built pedestrian trails, do not create trails within the woodlands

6.3.6 Protection of Bird Nests

The MBCA provides legal protection of migratory birds and their active nests in Canada. The loss of migratory bird nests, eggs and or nestlings due to tree cutting or other vegetation clearing can be avoided by clearing vegetation outside of the general nesting period for forest nesting migratory birds in this region (C2) as identified by ECCC (i.e., between April 1 and August 31) (ECCC 2023). If work must be performed within this window, a survey for active nests or breeding must be conducted by a qualified biologist before work commences and additional mitigation measures (e.g., implementation of avoidance distances during construction) implemented, if required.

6.4 Policy Conformity

The Subject Lands are located within a defined settlement area (within City's Urban Area Boundary – City OP Schedule B3), they are not part of the provincial Natural Heritage System. Portions of the Study Area are located within City's Core Natural Features and the Region's Core Environmental Features. A Regionally Significant Woodland feature and a Locally Significant Wetland feature are also present within portions of the Study Area; these designated natural heritage features are associated with a woodland and wetland located west of the agricultural field (where developments are proposed) on the Subject Lands. Potential SAR bat habitat confirmed SOCC (Eastern Wood-Pewee) habitat and confirmed SWH habitat have also been identified associated with the woodland and/or swamp features located predominantly west of the Subject Lands.

City OP Policy 8.2.4 (7) outlines a minimum 10 m setback to Core Natural Features from the dripline of the feature. Stantec and representatives from the Region and City staked the dripline of the woodlands on June 14, 2023, see OLS survey located in **Appendix G** for details.

City OP Policy 8.2.5 (7) outlines a minimum 15 m setback for Locally Significant Wetlands. Stantec and representatives from the GRCA staked the wetland boundaries on June 14, 2023, see OLS survey located in **Appendix G** for details.

Due to the location of the wetland feature within the greater woodland feature, the proposed 15 m setback from the wetland is located behind the proposed 10m setback from the woodland dripline, see Figure 3 located in **Appendix A** for details.

City OP Policies 8.2.4 (5) and (6) relate to the requirement for no adverse environmental impacts on the feature or its ecological function be demonstrated and that buffers (setback areas) are to be established with appropriate self-sustaining and undisturbed vegetation.



An edge management / restoration plan will be prepared by Stantec for the area between the existing woodland dripline and the 10 m setback (buffer) from the woodland dripline. Given the location of the Locally Significant Wetland, this setback also captures the 15 m setback from the wetland. It is Stantec's opinion that the 10 m setback and proposed restoration works is appropriate to support the protection and enhancement of the City's Core Natural Features and the Region's Core Environmental Features, including significant natural heritage features and habitat.

With the implementation of the mitigation recommendations, as described in **Section 6.2** and herein, the Project is considered in conformance with provincial and municipal natural heritage policies as described in **Section 4.1**.



7 Summary and Conclusion

Background data and previous site documentation guided the field program which took place in 2023. Field surveys focused on the Subject Lands and adjacent natural heritage features within the Study Area. Field surveys were completed for fish habitat, vegetation communities, avifauna, flora, targeted SAR habitat including SAR grassland birds, and wildlife habitat.

A Sugar Maple – Hardwood Forest and Silver Maple Swamp are located in the treed area west of the agricultural field (where developments are proposed) on the Subject Lands. The woodland and swamp communities are located in an area designated by the City and Region as Core Natural/Environmental Features. This area also encompasses Significant Woodlands and a Locally Significant Wetland. No aquatic habitat features are present within the Study Area.

Four SOCC (Eastern Wood-Pewee, Willow Flycatcher, Red-bellied Woodpecker, and Great Blue Heron) were observed during the 2023 field program. The SOCC habitat is located in the woodlands/swamp west of the agricultural field associated with the Subject Lands in the Study Area. Additional SOCC may be present outside of the Study Area in the PSW (north-east of the Study Area) or woodlands and pond system. SAR bat treed habitat, Terrestrial Crayfish habitat and Pileated Woodpecker habitat were observed in the terrestrial and wetland communities in the Study Area, west of the agricultural field associated with the Subject Lands.

Stantec, the City, the Region and the GRCA reviewed the site in June 2023. The proposed development will result in a permanent direct loss of 14.71 ha of agricultural land (OAGM1), 0.38 ha of meadow habitat (MEFM4 and MEMM4), and 0.13 ha of deciduous thicket (THDM5-a) on the Subject Lands. The results of the field surveys have determined that these features provide habitat for urban tolerant species on the Subject Lands.

Environmental protection and mitigation measures are proposed to protect the woodland and wetland features located west of the agricultural field (where developments are proposed) on the Subject Lands. The Environmental protection and mitigation measures include the implementation of an ESC plan and associated monitoring program, construction timing windows outside of wildlife breeding windows, setbacks to the woodland and significant wetland feature and conversion of 0.33 ha of agricultural land to forest habitat to expand the existing feature. It is Stantec's opinion that the setback and proposed restoration works will support the protection and enhancement of the City's Core Natural Features and the Region's Core Environmental Features, including significant natural heritage features and habitat.

With the implementation of the environmental protection and mitigation recommendations, as described in **Section 6.2** and herein, the development proposal meets the natural heritage policy objectives outlined in the PPS and upper and lower tier OPs. This EIS is in support of the proposed development as the benefits outweigh the potential impacts to the local environment and residents.



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8 References

May 14, 2025

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8 References

May 14, 2025

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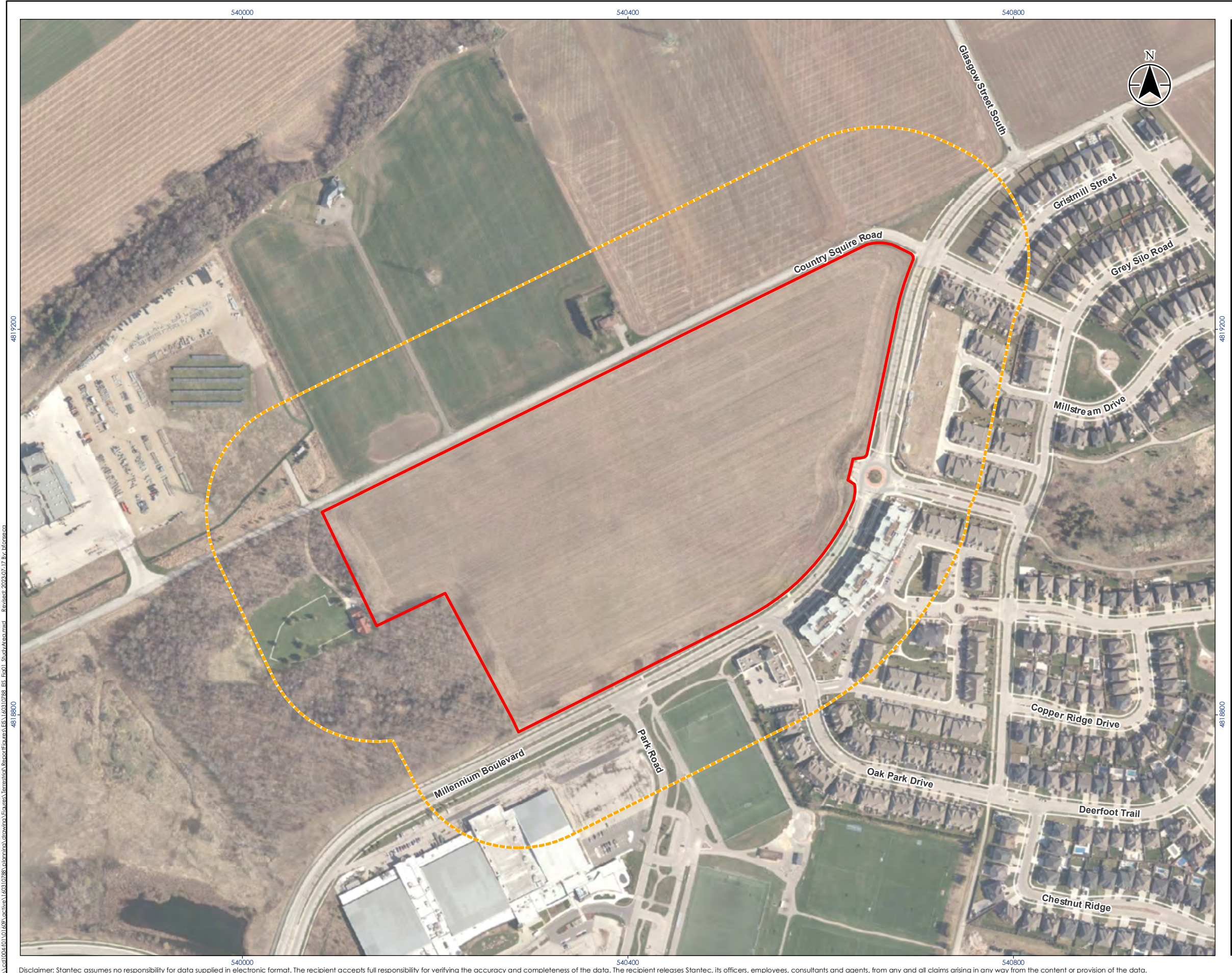


Appendices

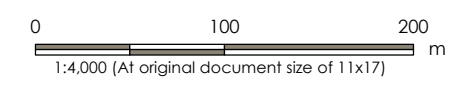


Appendix A Figures

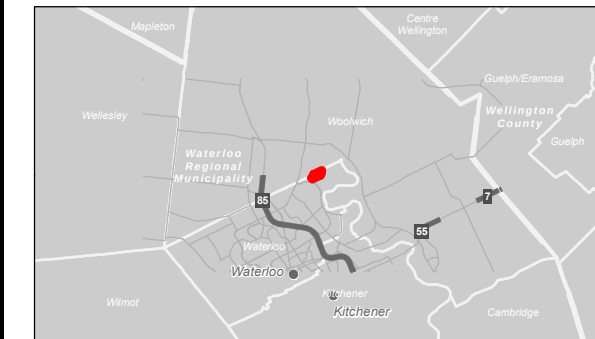




- Legend
- Subject Lands
 - Study Area (120 m)



- Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
 2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2023.
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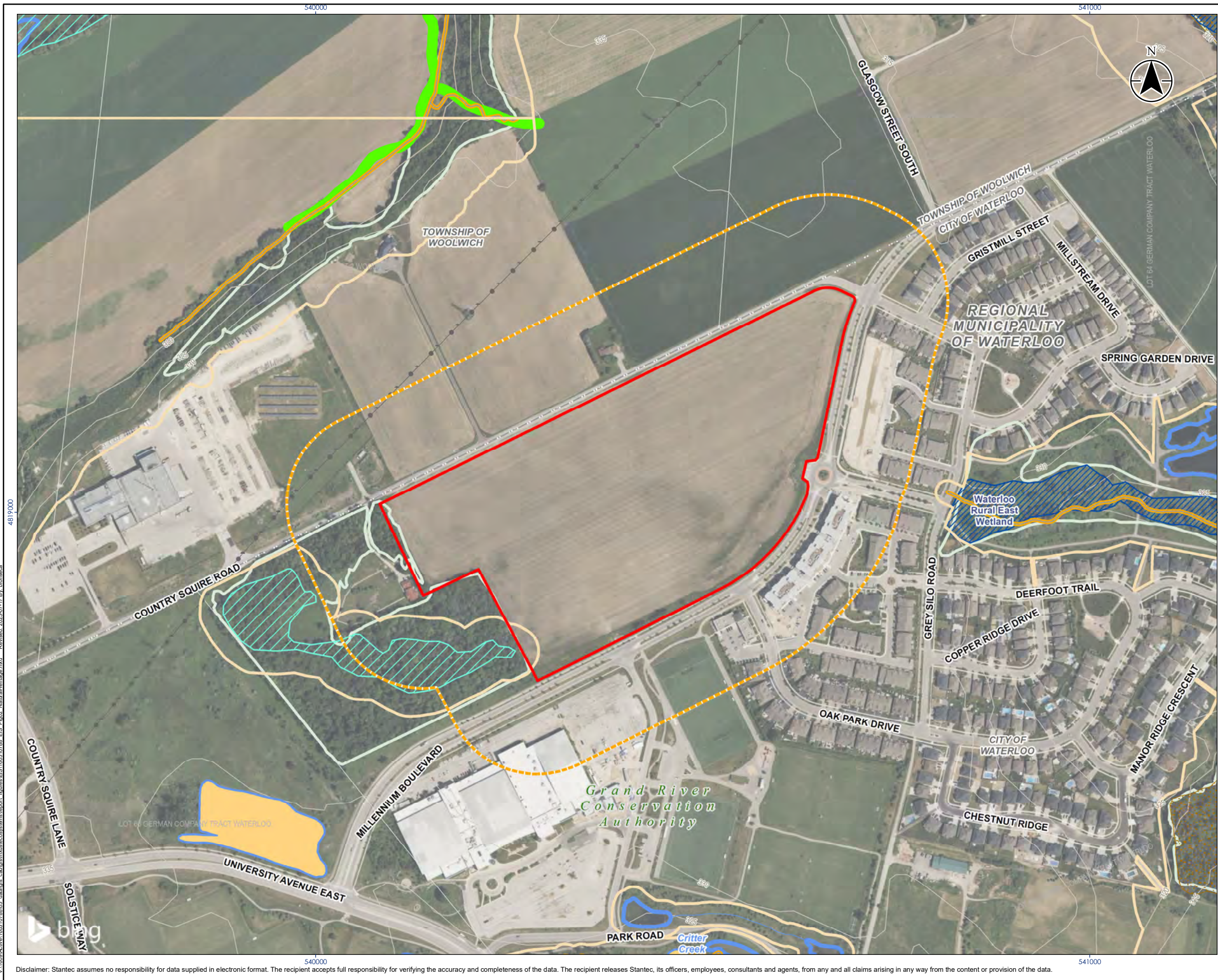
Project Location
Waterloo, ON

160310788 REVA
Prepared by BF on 2023-07-17
Technical Review by DH on 2023-07-06

Client/Project
ACTIVA HOLDINGS INC.
ENVIRONMENTAL IMPACT STATEMENT UPDATE
400 MILLENNIUM BOULEVARD, WATERLOO, ON

Figure No.
1

Title
Study Area



Legend

	Subject Lands		Wetland, Provincially Significant
	Study Area (120 m)		Wetland, Unevaluated
	Thermal Regime, Warm		Wooded Area
	Hydro Line		Lot
	Watercourse (Permanent)		Municipal Boundary, Upper
	Conservation Authority Administrative Boundary		Municipal Boundary, Lower
	Overwintering Area		Regulation Limit (GRCA, 2023)
	Thermal Regime, Warm		
	Aquatic Species at Risk Distribution		
	Waterbody		

1:5,000 (At original document size of 11x17)

Notes

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- This figure contains information made available under Grand River Conservation Authority's Open Data Licence v2.0.

Project Location
Waterloo, ON

160310788 REVA
Prepared by BF on 2023-07-17

Client/Project
ACTIVA HOLDINGS INC.
ENVIRONMENTAL IMPACT STATEMENT UPDATE
400 MILLENNIUM BOULEVARD, WATERLOO, ON

Figure No.
2

Title
Natural Heritage Designation Areas

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

Appendix B Records of Correspondence



Cymbaly, Lauren

From: Cymbaly, Lauren
Sent: Thursday, April 27, 2023 5:05 PM
To: laura.dewar@waterloo.ca; robyn.mcmullen@waterloo.ca; SYip@regionofwaterloo.ca; JGurney@regionofwaterloo.ca
Cc: Paul Britton; Fraser, Trevor; Taylor, Andrew (Guelph); Peter Armbruster - Activa Holdings Inc. (peter.armbruster@activa.ca)
Subject: EIS Terms of Reference - 400 Millennium Boulevard, Waterloo, ON
Attachments: Draft EIS TOR_400 Millennium Blvd_20230427.pdf

Good afternoon,

Stantec has been retained to update an EIS associated with municipal address 400 Millennium Boulevard. Please see attached regarding proposed studies to address natural heritage in support of the planning application.

Please let us know if you have any questions or comments regarding the attached.

Further, if you could also please let us know if you or any associated reviewers are interested in visiting the site to review natural heritage features prior to the application submission. Please note that our team is proposing to stake the wetland feature in June 2023 once the vegetation has fully emerged.

Thank you and again, please don't hesitate to contact us if you have any questions or wish to discuss any line items.

Kind regards,
Lauren

Lauren Cymbaly, M.E.S.

Senior Ecologist
Stantec
100 – 401 Wellington Street West, Toronto ON M5V 1E7
Phone: (416) 786-1302
Fax: (416) 596-6680
Lauren.Cymbaly@stantec.com



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Stantec Consulting Ltd.
100 – 401 Wellington Street West
Toronto, ON M5V 1E7

April 27, 2023

Project No.: 160310788

Laura Dewar, MCIP, RPP, Senior Development Planner, Planning Approvals

Waterloo City Centre, Planning Division
100 Regina Street South
Planning Division – Second Floor
Waterloo, ON M2J 4A8

Dear Laura Dewar,

**Reference: Terms of Reference – Environmental Impact Study Update
400 Millennium Boulevard, Waterloo, ON**

1 Introduction

Stantec Consulting Ltd. (Stantec) has been retained by Activa Holdings Inc. (Proponent) to prepare an Environmental Impact Study Update (EIS) including Edge Management and Restoration Plan for lands associated with municipal address 400 Millennium Boulevard, Waterloo, Ontario and legally described as Block 320 Registered Plan 58M-506 (Geographic Township of Waterloo), City of Waterloo in the Regional Municipality of Waterloo (herein referred to as the "Subject Lands").

The Subject Lands encompass approximately 15 hectares (ha) of undeveloped land currently established with an active agricultural field (Block 320), see Figure 1 in Attachment A for details. The Subject Lands have been identified by the City of Waterloo (City) as a Designated Greenfield Area (City Official Plan Schedule 'B3') and zoned for high density employment purposes. A woodlot and unevaluated wetland are present directly west of the Subject Lands, these features are designated by the City as Core Natural Features (Schedule 'A4'). The Proponent wishes to develop a mixed-use subdivision including medium-high density residential lots and commercial lots on the Subject Lands; developments are not proposed within the woodlot or wetland features. The draft plan of subdivision (Plan A1, MHBC dated March 15, 2023) also includes parking lots, various access roads, a stormwater Management Pond and a park on the Subject Lands (herein referred to as the "Project").

Stantec prepared an EIS that included the Subject Lands in 2008 in support of Registration. Given the date of the report, the following Terms of Reference (ToR) has been prepared to outline the scope of work proposed to update the EIS as part of a "complete application" in accordance with direction received at the pre-submission consultation meeting.

Reference: Terms of Reference – Environmental Impact Study Update
400 Millennium Boulevard, Waterloo, ON

2 Scope of Work

2.1 Background Review

The Subject Lands are located within the City of Waterloo (City) and within the administrative jurisdiction of the Grand River Conservation Authority (GRCA). Woodlands and an unevaluated wetland abut the Subject Lands to the west (Block 326 on plan 58M-506). The City has designated the woodlands and wetland west of the Subject Lands as Core Natural Features (Schedule 'A4').

Headwater drainage features may be present on the Subject Lands. The Subject Lands drain to the Horst Tributary east of Grey Silo Road which eventually outlets to the Grand River. The Waterloo Rural East Wetland is a Provincially Significant Wetland (PSW) complex which surrounds this tributary and is present on large portions of the undeveloped treed area east of the current residential subdivision located east and south of the Subject Lands (Carriage Crossing Subdivision).

Given this natural and geographic context, the following documents and information sources will be reviewed as part of the assessment:

- The Provincial Policy Statement (MMAH 2020)
- Growth Plan for the Greater Golden Horseshoe (MMAH 2020)
- Regional Official Plan (Region of Waterloo, 2015)
- City of Waterloo Official Plan (City of Waterloo, 2020)
- GRCA regulations, records and database reviews
- *Endangered Species Act* (2007) and associated regulations
- Ministry of Natural Resources and Forestry (MNRF) Land Information Ontario (LIO) database, including mapping of designated natural areas, topographic mapping, etc.
- MNRF's Natural Heritage Information Centre (NHIC) database
- Species at Risk (SAR) and wildlife atlas database reviews
- Topographic mapping
- Historical and current high resolution ortho imaging
- Functional Servicing Report / Stormwater Management Report
- Hydrogeological Assessment, site water balance and/or feature-based water balance as available
- Previous data collected and/or reports prepared by others as available

2.2 Field Program

Site investigations will confirm and update existing information regarding the natural features on the Subject Lands. Adjacent Lands are considered lands within a 120 m radius of the Subject Lands to account for provincial policies in accordance with the 2020 Provincial Policy Statement (PPS) and the 2020 Growth Plan (MMAH 2020) under the *Planning Act* (1990). Adjacent Lands will be assessed by a combination of background data reviews, from the edge of the Subject Lands and where access is permitted / is feasible.

Reference: Terms of Reference – Environmental Impact Study Update
400 Millennium Boulevard, Waterloo, ON

The following surveys will be completed as part of the EIS to support the application:

- **Floral inventory and vegetation community mapping:** a floral inventory will be completed in concert with Ecological Land Classification (Lee et al., 1998) mapping during the growing season (two site visits; summer and fall) to confirm or update previous mapping and inventories completed for the Subject Lands.
- **Wetland delineation:** the wetland boundaries will be delineated following provincial standards (Ontario Wetland Evaluation System for Southern Ontario).
- **Natural Feature Staking:** Stantec will work with the City of Waterloo and Region of Waterloo (and any other applicable agencies / stakeholders who will be reviewing the EIS) to schedule a site visit, proposed in June 2023. An Ontario Land Surveyor (OLS) will be present to stake and survey the natural heritage feature limits (wetland and woodlot, as required).
- **Breeding bird survey:** A breeding bird survey, including 3 site visits will be completed between the end of May and early July in accordance with MNRF requirements for grassland species at risk (SAR) bird species.
- **Incidental wildlife:** Incidental wildlife observations will be recorded throughout the field program.
- **Headwater Drainage Feature Assessment (HDFA):** The HDFA will be completed in accordance with agency approved protocols (Evaluation, Classification and Management of Headwater Drainage Features Guidelines, CVC and TRCA, 2014). A minimum of two site visits will be completed during the appropriate timing windows. A third site visit will be scheduled, if required (pending the results of the first two site visits).
- **Wildlife habitat:** wildlife habitat observed will be documented throughout the field program. This data will be used in conjunction with the data from the other ecology surveys listed in the field program for the assessment of Significant Wildlife Habitat (SWH) and Species at Risk (SAR) habitat.

2.3 Reporting

Stantec will prepare a scoped EIS Update report that will highlight changes to existing conditions from the previous EIS (Stantec, 2008) based on historical air photo review and the results of the 2023 field program, as outlined in Section 2.2. The EIS will also identify constraints, including setbacks/buffer requirements based on applicable natural heritage policies at the time of EIS submission, assess potential impacts of the proposed development, provide mitigation, compensation and environmental management recommendations, including Edge Management and Restoration Plan.

Stantec will work with the proponent and the City to discuss and include provision for servicing corridor(s) to service adjacent development and any trail locations, and these items will be addressed and included in the EIS and Edge Management and Restoration Plan.

Natural heritage data will be compiled on a georeferenced plan in a GIS environment to easily integrate with development plans and municipal mapping. As applicable, authorization and permitting requirements under the Conservation Authorities Act, Endangered Species Act (ESA) and Fisheries Act will also be identified.

An Edge Management and Restoration Plan will be prepared under separate cover to address City and agency requirements to support the EIS and Draft Plan of Subdivision. This report will be included as an appendix to the EIS or submitted separately as part of the overall package submission.

Reference: Terms of Reference – Environmental Impact Study Update
400 Millennium Boulevard, Waterloo, ON

Stantec has been retained to prepare the Storm Water Management (SWM) report to support the application. The SWM report is being prepared under separate cover and will be submitted separately as part of the overall package submission. The EIS will address the results of the SWM report as they pertain to natural heritage. The results of the HDFA and SWM studies will inform hydraulic inputs to the existing wetland feature and a drainage strategy will be developed to support the application.

3 Closure

We trust that this ToR provides a clear understanding of the natural heritage assessment, the planned site investigations, and methods to evaluate natural heritage features. Please contact Stantec with any comments or questions you may have regarding the ToR.

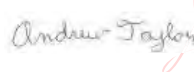
Sincerely,

Stantec Consulting Ltd.



Digitally signed by
Cymbaly, Lauren
Date: 2023.04.27
13:00:51 -04'00'

Lauren Cymbaly MES
Senior Ecologist
Mobile: (416) 786-1302
lauren.cymbaly@stantec.com



Digitally signed by Taylor,
Andrew (Guelph)
Date: 2023.04.27
13:57:54 -04'00'

Andrew Taylor B.Sc.
Senior Ecologist
Mobile: (519) 820-6149
andrew.taylor@stantec.com

Attachment: Attachment A: Figure 1 – Study Area

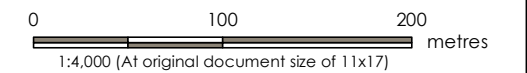
cc. Activa Holdings Inc. 735 Bridge Street West Waterloo ON N2V 2H1

Reference: Terms of Reference – Environmental Impact Study Update
400 Millennium Boulevard, Waterloo, ON

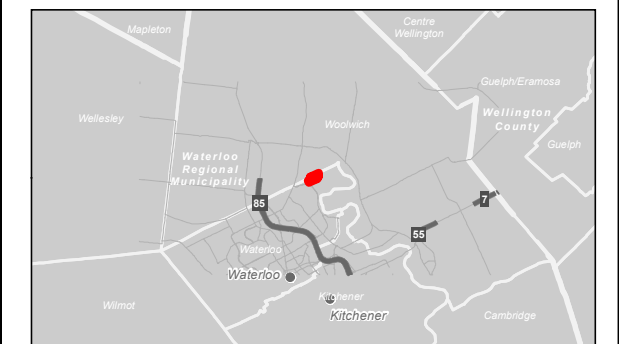
Attachment A Figure 1 – Study Area



- Subject Lands
- Study Area (120 m)



- Notes**
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 2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017.
 3. Orthimagery © 2023 Microsoft Corporation © 2023 Maxar ©CNES (2023) Distribution Airbus DS.



Project Location: 160310788 REVA
Waterloo, ON
Prepared by BF on 2023-04-18
Technical Review by DH on 2023-03-06

Client/Project:
ACTIVA HOLDINGS INC.
ENVIRONMENTAL IMPACT STUDY UPDATE
400 MILLENNIUM BOULEVARD, WATERLOO, ON

Figure No.
1

Title
Study Area

Cymbaly, Lauren

From: Cymbaly, Lauren
Sent: Tuesday, May 16, 2023 1:30 PM
To: Jane Gurney
Cc: 'Robyn McMullen'; Trevor Heywood
Subject: RE: EIS Terms of Reference - 400 Millennium Boulevard, Waterloo, ON

Hi Jane,

Thank you for your comments. We acknowledge the contents of the email below and do not have any associated questions or concerns; the EIS will address the listed items. There currently are no plans for modification or removal of the designated environmental features and as such, we don't anticipate the TOR will need to be updated.

We will send a follow up email to arrange site visit/feature staking scheduling shortly.

Thanks,

Kind Regards,

Lauren Cymbaly, M.E.S.

Senior Ecologist
Stantec
100 – 401 Wellington Street West, Toronto ON M5V 1E7
Phone: (416) 786-1302
Fax: (416) 596-6680
Lauren.Cymbaly@stantec.com

VACATION ALERT – May 19 – May 22



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From: Jane Gurney <JGurney@regionofwaterloo.ca>
Sent: Tuesday, May 9, 2023 11:11 AM
To: Cymbaly, Lauren <Lauren.Cymbaly@stantec.com>
Cc: 'Robyn McMullen' <Robyn.McMullen@waterloo.ca>; Trevor Heywood <theywood@grandriver.ca>
Subject: RE: EIS Terms of Reference - 400 Millennium Boulevard, Waterloo, ON

Lauren,

The Region has received and reviewed the "Terms of Reference – Environmental Impact Study Update, 400 Millennium Boulevard, Waterloo ON" (TOR) from Stantec Consulting Ltd., dated April 27, 2023 (DOCS 4379197).

The approach proposed through the TOR, including the scoped update to an earlier (2008) Environmental Impact Statement (EIS) and the proposed Field Program identified in Section 2.2 of the TOR are generally satisfactory to the Region, provided the comments from the GRCA (Trevor Heywood, May 3, 2023) and the City (Robyn McMullen, May 5, 2023) are incorporated and the following comments are acknowledged.

Section 2.3 indicates “compensation and environmental management” recommendations will be included. Please note that the region does not generally support compensation approaches, and if any of the designated environmental features are proposed to be modified or removed, an updated TOR with additional context may be required. It is noted that the following requirements identified through the pre-submission consultation have not been expressly incorporated in the TOR, but it is anticipated that they will be addressed as they are standard requirements. This includes the following:

- A biophysical survey to identify natural habitats and/or populations of Regionally significant plant and animal species on the subject lands that might be adversely affected by the proposed development; and
- Assessment of the design and operation of proposed stormwater management system(s) to demonstrate that the quantitative and qualitative aspects of hydrological and hydrogeological regimes sustaining Core Environmental Features will be maintained.

The EIS is requested to include a separate section that provides a listing of all recommendations to be implemented through the development of the subject lands, and any correspondence with MECP related to SAR are requested to be included as an Appendix to the EIS.

It is noted that a site visit is being coordinated, and Regional staff will attend.

If you have any questions or concerns, please let me know.

Jane E. Gurney, AICP, MCIP, RPP

Senior Planner
Community Planning
Planning, Development and Legislative Services
Region of Waterloo
150 Frederick Street, 8th Floor
Kitchener, ON N2G 4J3
Tel: 519-575-4500 Ext. 3454
Cell: 519-589-6921
JGurney@regionofwaterloo.ca

From: Cymbaly, Lauren <Lauren.Cymbaly@stantec.com>

Sent: April 27, 2023 5:05 PM

To: laura.dewar@waterloo.ca; robyn.mcmullen@waterloo.ca; Shilling Yip <SYip@regionofwaterloo.ca>; Jane Gurney <JGurney@regionofwaterloo.ca>

Cc: pbritton <pbritton@mnhbcplan.com>; Fraser, Trevor <Trevor.Fraser@stantec.com>; Taylor, Andrew (Guelph) <andrew.taylor@stantec.com>; Peter Armbruster - Activa Holdings Inc. (peter.armbruster@activa.ca) <peter.armbruster@activa.ca>

Subject: EIS Terms of Reference - 400 Millennium Boulevard, Waterloo, ON

****EXTERNAL ALERT** This email originated from outside the Region of Waterloo.**

Good afternoon,

Stantec has been retained to update an EIS associated with municipal address 400 Millennium Boulevard. Please see attached regarding proposed studies to address natural heritage in support of the planning application.

Please let us know if you have any questions or comments regarding the attached.

Further, if you could also please let us know if you or any associated reviewers are interested in visiting the site to review natural heritage features prior to the application submission. Please note that our team is proposing to stake the wetland feature in June 2023 once the vegetation has fully emerged.

Thank you and again, please don't hesitate to contact us if you have any questions or wish to discuss any line items.

Kind regards,
Lauren

Lauren Cymbaly, M.E.S.

Senior Ecologist

Stantec

100 – 401 Wellington Street West, Toronto ON M5V 1E7

Phone: (416) 786-1302

Fax: (416) 596-6680

Lauren.Cymbaly@stantec.com



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Caution: This email originated from outside of Stantec. Please take extra precaution.

Attention: Ce courriel provient de l'extérieur de Stantec. Veuillez prendre des précautions supplémentaires.

Atención: Este correo electrónico proviene de fuera de Stantec. Por favor, tome precauciones adicionales.

Cymbaly, Lauren

From: Robyn McMullen <Robyn.McMullen@waterloo.ca>
Sent: Tuesday, May 16, 2023 1:53 PM
To: Cymbaly, Lauren
Cc: Daniella Giovanatto; Trevor Heywood; Jane Gurney
Subject: RE: EIS Terms of Reference - 400 Millennium Boulevard, Waterloo, ON

Thanks Lauren. No further questions or concerns from me.

Kind regards,

Robyn

From: Cymbaly, Lauren <Lauren.Cymbaly@stantec.com>
Sent: May 16, 2023 1:24 PM
To: Robyn McMullen <Robyn.McMullen@waterloo.ca>
Cc: Daniella Giovanatto <Daniella.Giovanatto@waterloo.ca>; Trevor Heywood <theywood@grandriver.ca>; Jane Gurney <JGurney@regionofwaterloo.ca>
Subject: [EXTERNAL] RE: EIS Terms of Reference - 400 Millennium Boulevard, Waterloo, ON

Hi Robyn,

Thank you for your comments. We acknowledge the contents of the email below and provide the following responses for the associated line items.

1. Acknowledged, the EIS will review the November 2022 Office Consolidation.
2. There currently are no plans for modification or removal of the designated environmental features, including woodlands or wetlands. As such, it is our opinion there is sufficient data for the site through background data sources, as outlined in Section 2.1 (note that the Ontario Reptile and Amphibian Atlas will be reviewed) and the data from previous site surveys and technical reports to recommend appropriate environmental protection (buffers) and environmental mitigation measures.
3. Confirmed; the EIS will include recommendations related to any documented invasive species.

Let us know if you have any additional questions or concerns related to the above responses.

We will send a follow up email to arrange the site visit/feature-staking shortly.

Thanks,

Kind Regards,

Lauren Cymbaly, M.E.S.

Senior Ecologist

Stantec

100 – 401 Wellington Street West, Toronto ON M5V 1E7

Phone: (416) 786-1302

Fax: (416) 596-6680

Lauren.Cymbaly@stantec.com

VACATION ALERT – May 19 – May 22



 Please consider the environment before printing this email.

From: Robyn McMullen <Robyn.McMullen@waterloo.ca>
Sent: Friday, May 5, 2023 3:00 PM
To: Cymbaly, Lauren <Lauren.Cymbaly@stantec.com>
Cc: Daniella Giovanatto <Daniella.Giovanatto@waterloo.ca>; Trevor Heywood <theywood@grandriver.ca>; Jane Gurney <JGurney@regionofwaterloo.ca>
Subject: RE: EIS Terms of Reference - 400 Millennium Boulevard, Waterloo, ON

Hi Lauren,

I've reviewed the draft EIS Terms of Reference and my comments are below. Also, with respect to the site visit, myself and Daniella Giovanatto (Daniella.Giovanatto@waterloo.ca) would like to participate.

1. Under Section 2.1 – Background Review, the 2020 version of the City's Official Plan is listed as a document to be reviewed. The most current version is the November 2022 Office Consolidation (<https://www.waterloo.ca/en/government/official-plan.aspx>).
2. For the field program outlined under Section 2.2, it is questioned whether amphibian surveys should be undertaken, as I believe the 2008 EIS identified the woodland/wetland as potential Significant Wildlife Habitat for amphibians.
3. Under Section 2.3 – Reporting, it is noted that the EIS will identify constraints, including setbacks/buffer requirements, assess potential impacts of the proposed development, provide mitigation, compensation and environmental management recommendations, including Edge Management and Restoration Plan. Please confirm that this will include recommendations related to any documented invasive species.

Kind regards,

Robyn McMullen, MCIP, RPP (she/her)
Senior Policy Planner, Growth Management
Integrated Planning and Public Works, City of Waterloo
100 Regina Street South
PO Box 337, Station Waterloo
Waterloo, ON, N2J 4A8
P: 519-747-8531
TTY: 1-866-786-3941
E: robyn.mcmullen@waterloo.ca
www.waterloo.ca

From: Cymbaly, Lauren <Lauren.Cymbaly@stantec.com>
Sent: April 27, 2023 5:05 PM
To: Laura Dewar <Laura.Dewar@waterloo.ca>; Robyn McMullen <Robyn.McMullen@waterloo.ca>; SYip@regionofwaterloo.ca; JGurney@regionofwaterloo.ca
Cc: Paul Britton <pbritton@mhbcplan.com>; Fraser, Trevor <Trevor.Fraser@stantec.com>; Taylor, Andrew (Guelph) <andrew.taylor@stantec.com>; Peter Armbruster - Activa Holdings Inc. (peter.armbruster@activa.ca) <peter.armbruster@activa.ca>
Subject: [EXTERNAL] EIS Terms of Reference - 400 Millennium Boulevard, Waterloo, ON

Good afternoon,

Stantec has been retained to update an EIS associated with municipal address 400 Millennium Boulevard. Please see attached regarding proposed studies to address natural heritage in support of the planning application.

Please let us know if you have any questions or comments regarding the attached.

Further, if you could also please let us know if you or any associated reviewers are interested in visiting the site to review natural heritage features prior to the application submission. Please note that our team is proposing to stake the wetland feature in June 2023 once the vegetation has fully emerged.

Thank you and again, please don't hesitate to contact us if you have any questions or wish to discuss any line items.

Kind regards,
Lauren

Lauren Cymbaly, M.E.S.

Senior Ecologist

Stantec

100 – 401 Wellington Street West, Toronto ON M5V 1E7

Phone: (416) 786-1302

Fax: (416) 596-6680

Lauren.Cymbaly@stantec.com



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Cymbaly, Lauren

From: Trevor Heywood <theywood@grandriver.ca>
Sent: Tuesday, May 16, 2023 1:38 PM
To: Cymbaly, Lauren
Cc: Robyn McMullen; Jane Gurney; Whitehead, Grant
Subject: RE: EIS Terms of Reference - 400 Millennium Boulevard, Waterloo, ON
Attachments: 135_-_Eastbridge_District_North_Master_Drainage_Plan.pdf

Hey Lauren,

Please see the MDP attached.

Regards,

Trevor Heywood
Resource Planner
Grand River Conservation Authority

From: Cymbaly, Lauren <Lauren.Cymbaly@stantec.com>
Sent: Tuesday, May 16, 2023 12:48 PM
To: Trevor Heywood <theywood@grandriver.ca>
Cc: Robyn McMullen <Robyn.McMullen@waterloo.ca>; Jane Gurney <jgurney@regionofwaterloo.ca>; Whitehead, Grant <grant.whitehead@stantec.com>
Subject: RE: EIS Terms of Reference - 400 Millennium Boulevard, Waterloo, ON

Hi Trevor,

Thank you for your comments. We acknowledge the contents of the email below and do not have any associated questions or concerns; the EIS will address the listed items.

That being said, I couldn't seem to track down the referenced Eastbridge District North Master Drainage Plan (1997) report. Can you point me in the right direction for where I can obtain this report or please send directly?

We will send a follow up email to arrange site visit/feature staking scheduling shortly.

Thanks,

Kind Regards,

Lauren Cymbaly, M.E.S.
Senior Ecologist
Stantec
100 – 401 Wellington Street West, Toronto ON M5V 1E7
Phone: (416) 786-1302
Fax: (416) 596-6680
Lauren.Cymbaly@stantec.com

VACATION ALERT – May 19 – May 22





From: Trevor Heywood <theywood@grandriver.ca>
Sent: Wednesday, May 3, 2023 3:29 PM
To: Cymbaly, Lauren <Lauren.Cymbaly@stantec.com>
Cc: Robyn McMullen <Robyn.McMullen@waterloo.ca>; Jane Gurney <jgurney@regionofwaterloo.ca>
Subject: RE: EIS Terms of Reference - 400 Millennium Boulevard, Waterloo, ON

Hi Lauren,

We reviewed the ToR and have the following comments:

1. The ToR should specify that wetland delineation will be completed by OWES Certified personnel.
2. GRCA should be specifically mentioned as an attending agency to verify the wetland boundary in the field.
3. The ToR should specify that potential impacts to local site perviousness and water balance will be assessed and addressed. If a water balance assessment is being completed under separate cover (e.g. in a separate water balance study or stormwater management report), the relevant results of that report should be incorporated appropriately into the EIS, such that impacts to the wetland can be assessed and mitigated. Water balance study protocols, hydroperiod resolution (e.g. monthly), and proposed mitigations should be scoped to the sensitivity of the features present, and the scale of the development's impact on the hydrology.

We'd also advise that the Eastbridge District North Master Drainage Plan (1997) report could be reviewed for potentially relevant background information.

Thanks,

Trevor Heywood B.Sc.(Env.)
Resource Planner
Grand River Conservation Authority

400 Clyde Road, PO Box 729
Cambridge, ON N1R 5W6
Phone: 519-621-2763 ext. 2292
Email: theywood@grandriver.ca
www.grandriver.ca | [Connect with us on social media](#)

From: Robyn McMullen <Robyn.McMullen@waterloo.ca>
Sent: Friday, April 28, 2023 8:53 AM
To: Cymbaly, Lauren <Lauren.Cymbaly@stantec.com>; Laura Dewar <Laura.Dewar@waterloo.ca>; SYip@regionofwaterloo.ca; Jane Gurney <jgurney@regionofwaterloo.ca>; Trevor Heywood <theywood@grandriver.ca>
Cc: Paul Britton <pbritton@mhbcpplan.com>; Fraser, Trevor <Trevor.Fraser@stantec.com>; Taylor, Andrew (Guelph) <andrew.taylor@stantec.com>; Peter Armbruster - Activa Holdings Inc. (peter.armbruster@activa.ca) <peter.armbruster@activa.ca>
Subject: RE: EIS Terms of Reference - 400 Millennium Boulevard, Waterloo, ON

Thanks Lauren. I've copied Trevor Heywood at GRCA on this email and they will also need to review the TOR.

Kind regards,

Robyn McMullen, MCIP, RPP (she/her)
Senior Policy Planner, Growth Management
Integrated Planning and Public Works, City of Waterloo
100 Regina Street South
PO Box 337, Station Waterloo
Waterloo, ON, N2J 4A8
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Cc: Paul Britton <pbritton@mhbcplan.com>; Fraser, Trevor <Trevor.Fraser@stantec.com>; Taylor, Andrew (Guelph)
<andrew.taylor@stantec.com>; Peter Armbruster - Activa Holdings Inc. (peter.armbruster@activa.ca)
<peter.armbruster@activa.ca>
Subject: [EXTERNAL] EIS Terms of Reference - 400 Millennium Boulevard, Waterloo, ON

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Please let us know if you have any questions or comments regarding the attached.

Further, if you could also please let us know if you or any associated reviewers are interested in visiting the site to review natural heritage features prior to the application submission. Please note that our team is proposing to stake the wetland feature in June 2023 once the vegetation has fully emerged.

Thank you and again, please don't hesitate to contact us if you have any questions or wish to discuss any line items.

Kind regards,
Lauren

Lauren Cymbaly, M.E.S.
Senior Ecologist
Stantec
100 – 401 Wellington Street West, Toronto ON M5V 1E7
Phone: (416) 786-1302
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Lauren.Cymbaly@stantec.com



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Appendix C Vascular Plant List



Appendix C: Vascular Plant Observations

Family ¹	Scientific Name ¹	Common Name ¹	S-Rank ²	SARO Status ³	COSEWIC Status ⁴	Regional Significance ⁵ (Y/N)	Coefficient of Conservatism ⁶	Coefficient of Wetness ⁷
Aceraceae	<i>Acer negundo</i>	Manitoba Maple	S5	-	-	N	0	0
Aceraceae	<i>Acer rubrum</i>	Red Maple	S5	-	-	N	4	0
Aceraceae	<i>Acer saccharinum</i>	Silver Maple	S5	-	-	N	5	-3
Aceraceae	<i>Acer x freemanii</i>	Freeman's (Swamp) Maple	S5	-	-	N	6	-5
Aceraceae	<i>Acer saccharum</i>	Sugar Maple	S5	-	-	N	4	3
Adoxaceae	<i>Sambucus racemosa pubens</i>	Red Elderberry	S5	-	-	N	5	3
Amaranthaceae	<i>Oxybasis glauca</i>	Oak-leaved Goosefoot	SE5	-	-	N	-	-3
Anacardiaceae	<i>Toxicodendron radicans</i>	Poison Ivy	S5	-	-	N	2	0
Apiaceae	<i>Daucus carota</i>	Wild Carrot	SE5	-	-	N	-	5
Apocynaceae	<i>Apocynum androsaemifolium</i>	Spreading Dogbane	S5	-	-	N	3	5
Apocynaceae	<i>Apocynum cannabinum</i>	Hemp Dogbane	S5	-	-	N	3	0
Apocynaceae	<i>Asclepias incarnata</i>	Swamp Milkweed	S5	-	-	N	6	-5
Apocynaceae	<i>Asclepias syriaca</i>	Common Milkweed	S5	-	-	N	0	5
Apocynaceae	<i>Vincetoxicum rossicum</i>	European Swallowwort	SE5	-	-	N	-	5
Araceae	<i>Arisaema triphyllum</i>	Jack-in-the-pulpit	S5	-	-	N	5	-3
Asteraceae	<i>Arctium minus</i>	Common Burdock	SE5	-	-	N	-	3
Asteraceae	<i>Artemisia biennis</i>	Biennial Wormwood	SE5	-	-	N	-	-3
Asteraceae	<i>Bidens cernua</i>	Nodding Beggarticks	S5	-	-	N	2	-5
Asteraceae	<i>Centaurea sp.</i>	Knapweed species	-	-	-	N	-	-
Asteraceae	<i>Cichorium intybus</i>	Wild Chicory	SE5	-	-	N	-	5



Appendix C: Vascular Plant Observations

Family ¹	Scientific Name ¹	Common Name ¹	S-Rank ²	SARO Status ³	COSEWIC Status ⁴	Regional Significance ⁵ (Y/N)	Coefficient of Conservatism ⁶	Coefficient of Wetness ⁷
Asteraceae	<i>Cirsium arvense</i>	Canada Thistle	SE5	-	-	N	-	3
Asteraceae	<i>Cirsium vulgare</i>	Bull Thistle	SE5	-	-	N	-	3
Asteraceae	<i>Erigeron annuus</i>	Annual Fleabane	S5	-	-	N	0	3
Asteraceae	<i>Erigeron canadensis</i>	Canada Horseweed	S5	-	-	N	0	3
Asteraceae	<i>Eutrochium maculatum</i>	Spotted Joe Pye Weed	S5	-	-	N	3	-5
Asteraceae	<i>Euthamia graminifolia</i>	Grass-leaved Goldenrod	S5	-	-	N	2	0
Asteraceae	<i>Gnaphalium uliginosum</i>	Low Cudweed	SE5	-	-	N	-	0
Asteraceae	<i>Solidago altissima</i>	Tall Goldenrod	S5	-	-	N	1	3
Asteraceae	<i>Solidago canadensis</i>	Canada Goldenrod	S5	-	-	N	1	3
Asteraceae	<i>Solidago flexicaulis</i>	Zigzag Goldenrod	S5	-	-	N	6	3
Asteraceae	<i>Sonchus arvensis</i>	Field Sow-thistle	SE5	-	-	N	-	3
Asteraceae	<i>Symphyotrichum lanceolatum</i>	Panicked Aster	S5	-	-	N	3	-3
Asteraceae	<i>Symphyotrichum lateriflorum</i>	Calico Aster	S5	-	-	N	3	0
Asteraceae	<i>Symphyotrichum novae-angliae</i>	New England Aster	S5	-	-	N	2	-3
Asteraceae	<i>Symphyotrichum pilosum</i> var. <i>pilosum</i>	Old Field Aster	S5	-	-	N	1	3
Asteraceae	<i>Tanacetum vulgare</i>	Common Tansy	SE5	-	-	N	-	5
Asteraceae	<i>Taraxacum officinale</i>	Common Dandelion	SE5	-	-	N	-	3
Asteraceae	<i>Tussilago farfara</i>	Coltsfoot	SE5	-	-	N	-	3
Athyriaceae	<i>Athyrium filix-femina</i>	Common Lady Fern	S5	-	-	N	4	0
Balsaminaceae	<i>Impatiens capensis</i>	Spotted Jewelweed	S5	-	-	N	4	-3



Appendix C: Vascular Plant Observations

Family ¹	Scientific Name ¹	Common Name ¹	S-Rank ²	SARO Status ³	COSEWIC Status ⁴	Regional Significance ⁵ (Y/N)	Coefficient of Conservatism ⁶	Coefficient of Wetness ⁷
Berberidaceae	<i>Caulophyllum thalictroides</i>	Blue Cohosh	S5	-	-	N	5	5
Berberidaceae	<i>Podophyllum peltatum</i>	May-apple	S5	-	-	N	5	3
Betulaceae	<i>Ostrya virginiana</i>	Eastern Hop-hornbeam	S5	-	-	N	4	3
Brassicaceae	<i>Alliaria petiolata</i>	Garlic Mustard	SE5	-	-	N	-	0
Brassicaceae	<i>Erysimum cheiranthoides</i>	Wormseed Wallflower	S5	-	-	N	-	3
Caprifoliaceae	<i>Viburnum lantanoides</i>	Hobblebush	S5	-	-	Y	8	0
Convolvulaceae	<i>Convolvulus arvensis</i>	Field Bindweed	SE5	-	-	N	-	5
Cornaceae	<i>Cornus sericea</i>	Red-osier Dogwood	S5	-	-	N	2	-3
Cyperaceae	<i>Carex albursina</i>	White Bear Sedge	S5	-	-	N	7	5
Cyperaceae	<i>Carex communis</i>	Fibrous-root Sedge	S5	-	-	N	6	5
Cyperaceae	<i>Carex grayi</i>	Gray's Sedge	S4	-	-	Y	8	-3
Cyperaceae	<i>Carex hirtifolia</i>	Pubescent Sedge	S4, S5	-	-	N	5	5
Cyperaceae	<i>Carex intumescens</i>	Bladder Sedge	S5	-	-	N	6	-3
Cyperaceae	<i>Carex pedunculata</i>	Long-stalked Sedge	S5	-	-	N	5	3
Cyperaceae	<i>Carex plantaginea</i>	Plantain-leaved Sedge	S5	-	-	N	7	5
Cyperaceae	<i>Cyperus esculentus</i>	Perennial Yellow Flatsedge	S5	-	-	N	1	-3
Cyperaceae	<i>Schoenoplectus tabernaemontani</i>	Soft-stemmed Bulrush	S5	-	-	N	5	-5
Dipsacaceae	<i>Dipsacus fullonum</i>	Common Teasel	SE5	-	-	N	-	3
Dryopteridaceae	<i>Dryopteris carthusiana</i>	Spinulose Wood Fern	S5	-	-	N	5	-3
Dryopteridaceae	<i>Onoclea sensibilis</i>	Sensitive Fern	S5	-	-	N	4	-3



Appendix C: Vascular Plant Observations

Family ¹	Scientific Name ¹	Common Name ¹	S-Rank ²	SARO Status ³	COSEWIC Status ⁴	Regional Significance ⁵ (Y/N)	Coefficient of Conservatism ⁶	Coefficient of Wetness ⁷
Dryopteridaceae	<i>Polystichum acrostichoides</i>	Christmas Fern	S5	-	-	N	5	3
Equisetaceae	<i>Equisetum arvense</i>	Field Horsetail	S5	-	-	N	0	0
Euphorbiaceae	<i>Euphorbia virgata</i>	Leafy Spurge	SE	-	-	N	-	5
Fabaceae	<i>Medicago lupulina</i>	Black Medick	SE5	-	-	N	-	3
Fabaceae	<i>Securigera varia</i>	Purple Crown-vetch	SE5	-	-	N	-	5
Fabaceae	<i>Trifolium pratense</i>	Red Clover	SE5	-	-	N	-	3
Fabaceae	<i>Vicia cracca</i>	Tufted Vetch	SE5	-	-	N	-	5
Fagaceae	<i>Fagus grandifolia</i>	American Beech	S4	-	-	N	6	3
Fagaceae	<i>Quercus macrocarpa</i>	Bur Oak	S5	-	-	N	5	3
Fagaceae	<i>Quercus robur</i>	English Oak	SE1	-	-	N	-	5
Fagaceae	<i>Quercus rubra</i>	Northern Red Oak	S5	-	-	N	6	3
Geraniaceae	<i>Geranium robertianum</i>	Herb-Robert	S5	-	-	N	2	3
Hypericaceae	<i>Hypericum perforatum</i> ssp. <i>perforatum</i>	Common St. John's-wort	SE5	-	-	N	-	5
Lamiaceae	<i>Leonurus cardiaca</i>	Common Motherwort	SE5	-	-	N	-	5
Lamiaceae	<i>Lycopus europaeus</i>	European Water-horehound	SE5	-	-	N	-	-5
Liliaceae	<i>Erythronium albidum</i>	White Trout-lily	S4	-	-	Y	8	3
Liliaceae	<i>Erythronium americanum</i>	Yellow Trout-lily	S5	-	-	N	5	5
Liliaceae	<i>Trillium grandiflorum</i>	White Trillium	S5	-	-	N	5	3
Linderniaceae	<i>Lindernia dubia</i>	Yellow-seed False Pimpernel	S4	-	-	Y	7	-5
Lythraceae	<i>Lythrum salicaria</i>	Purple Loosestrife	SE5	-	-	N	-	-5
Malvaceae	<i>Abutilon theophrasti</i>	Velvetleaf	SE5	-	-	N	-	3



Appendix C: Vascular Plant Observations

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Oleaceae	<i>Fraxinus americana</i>	White Ash	S4	-	-	N	4	3
Oleaceae	<i>Fraxinus pennsylvanica</i>	Red Ash	S4	-	-	N	3	-3
Onagraceae	<i>Circaea alpina</i>	Small Enchanter's Nightshade	S5	-	-	N	6	-3
Onagraceae	<i>Circaea canadensis</i>	Enchanter's Nightshade	S5	-	-	N	2	3
Onocleaceae	<i>Matteuccia struthiopteris</i>	Ostrich Fern	S5	-	-	N	5	0
Onocleaceae	<i>Onoclea sensibilis</i>	Sensitive Fern	S5	-	-	N	4	-3
Onagraceae	<i>Epilobium parviflorum</i>	Small-flowered Hairy Willowherb	SE4	-	-	N	-	3
Oxalidaceae	<i>Oxalis</i> sp.	Wood-sorrel Species	-	-	-	N	-	-
Plantaginaceae	<i>Plantago lanceolata</i>	English Plantain	SE5	-	-	N	-	3
Plantaginaceae	<i>Plantago major</i>	Common Plantain	SE5	-	-	N	-	3
Plantaginaceae	<i>Veronica peregrina</i>	Purslane Speedwell	S5	-	-	N	0	0
Poaceae	<i>Agrostis gigantea</i>	Redtop	SE5	-	-	N		-3
Poaceae	<i>Agrostis stolonifera</i>	Creeping Bentgrass	SE5	-	-	N	-	-3
Poaceae	<i>Bromus inermis</i>	Smooth Brome	SE5	-	-	N	-	5
Poaceae	<i>Echinochloa crus-galli</i>	Large Barnyard Grass	SE5	-	-	N	-	-3
Poaceae	<i>Elymus hystrix</i>	Bottlebrush Grass	S5	-	-	N	5	5
Poaceae	<i>Elymus repens</i>	Quackgrass	SE5	-	-	N	-	3
Poaceae	<i>Glyceria striata</i>	Fowl Mannagrass	S5	-	-	N	3	-5
Poaceae	<i>Oryzopsis asperifolia</i>	Rough-leaved Mountain Rice	S5	-	-	N	6	5



Appendix C: Vascular Plant Observations

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Poaceae	<i>Panicum capillare</i>	Common Panicgrass	S5	-	-	N	0	0
Poaceae	<i>Panicum dichotomiflorum</i>	Fall Panicgrass	SE5	-	-	N		-3
Poaceae	<i>Phalaris arundinacea</i>	Reed Canarygrass	S5	-	-	N	0	-3
Poaceae	<i>Phragmites australis</i>	Common Reed	SU	-	-	N	0	-3
Poaceae	<i>Poa pratensis</i>	Kentucky Bluegrass	S5	-	-	N	0	3
Poaceae	<i>Setaria pumila</i>	Yellow Foxtail	SE5	-	-	N	-	0
Poaceae	<i>Triticum aestivum</i>	Common Wheat	SE1	-	-	N	-	-
Polygonaceae	<i>Persicaria maculosa</i>	Spotted Lady's-thumb	SE5	-	-	N	-	-3
Polygonaceae	<i>Persicaria pensylvanica</i>	Pennsylvania Smartweed	S5	-	-	N	3	-3
Polygonaceae	<i>Rumex crispus</i>	Curled Dock	SE5	-	-	N	-	0
Ranunculaceae	<i>Actaea rubra</i>	Red Baneberry	S5	-	-	N	6	3
Ranunculaceae	<i>Ranunculus acris</i>	Common Buttercup	SE5	-	-	N	-	0
Ranunculaceae	<i>Ranunculus repens</i>	Creeping Buttercup	SE5	-	-	N	-	0
Ranunculaceae	<i>Thalictrum dioicum</i>	Early Meadow-rue	S5	-	-	N	6	3
Rhamnaceae	<i>Rhamnus cathartica</i>	European Buckthorn	SE5	-	-	N	-	0
Rosaceae	<i>Fragaria virginiana</i>	Wild Strawberry	S5	-	-	N	2	3
Rosaceae	<i>Fragaria vesca</i>	Woodland Strawberry	S5	-	-	N	4	3
Rosaceae	<i>Potentilla norvegica</i>	Rough Cinquefoil	S5	-	-	N	0	0
Rosaceae	<i>Prunus serotina</i>	Black Cherry	S5	-	-	N	3	3
Rosaceae	<i>Prunus virginiana</i> var. <i>virginiana</i>	Chokecherry	S5	-	-	N	2	3



Appendix C: Vascular Plant Observations

Family ¹	Scientific Name ¹	Common Name ¹	S-Rank ²	SARO Status ³	COSEWIC Status ⁴	Regional Significance ⁵ (Y/N)	Coefficient of Conservatism ⁶	Coefficient of Wetness ⁷
Rosaceae	<i>Rubus idaeus ssp. strigosus</i>	North American Red Raspberry	S5	-	-	N	2	3
Rosaceae	<i>Rubus occidentalis</i>	Black Raspberry	S5	-	-	N	2	5
Rubiaceae	<i>Galium mollugo</i>	Smooth Bedstraw	SE5	-	-	N	-	5
Rubiaceae	<i>Galium odoratum</i>	Sweet-scented Bedstraw	SE1	-	-	N		5
Salicaceae	<i>Populus x canadensis</i>	Carolina Poplar	SNA	-	-	N	-	-
Salicaceae	<i>Salix cordata</i>	Heart-leaved Willow	S4	-	-	Y	9	0
Salicaceae	<i>Salix eriocephala</i>	Cottony Willow	S5	-	-	N	4	-3
Salicaceae	<i>Salix interior</i>	Sandbar Willow	S5	-	-	N	1	-3
Salicaceae	<i>Salix purpurea</i>	Purple Willow	SE4	-	-	N	-	-3
Scrophulariaceae	<i>Verbascum thapsus ssp. thapsus</i>	Common Mullein	SE5	-	-	N	-	5
Solanaceae	<i>Solanum dulcamara</i>	Bittersweet Nightshade	SE5	-	-	N	-	0
Thelypteridaceae	<i>Parathelypteris noveboracensis</i>	New York Fern	S4, S5	-	-	N	7	0
Tiliaceae	<i>Tilia americana</i>	Basswood	S5	-	-	N	4	3
Tiliaceae	<i>Tilia cordata</i>	Little-leaved Linden	SE1	-	-	N	-	5
Typhaceae	<i>Typha angustifolia</i>	Narrow-leaved Cattail	SE5	-	-	N	-	-5
Ulmaceae	<i>Ulmus americana</i>	White Elm	S5	-	-	N	3	-3
Urticaceae	<i>Boehmeria cylindrica</i>	Small-spike False Nettle	S5	-	-	N	4	-5
Urticaceae	<i>Laportea canadensis</i>	Canada Wood Nettle	S5	-	-	N	6	-3
Urticaceae	<i>Urtica dioica</i>	Stinging Nettle	SE2	-	-	N	-	0
Urticaceae	<i>Urtica gracilis</i>	Slender Stinging Nettle	S5	-	-	N	-	-



Appendix C: Vascular Plant Observations

Family ¹	Scientific Name ¹	Common Name ¹	S-Rank ²	SARO Status ³	COSEWIC Status ⁴	Regional Significance ⁵ (Y/N)	Coefficient of Conservatism ⁶	Coefficient of Wetness ⁷
Viburnaceae	<i>Sambucus racemosa</i>	Red Elderberry	S5	-	-	N	5	3
Viburnaceae	<i>Viburnum lantana</i>	Wayfaring Viburnum	SE2	-	-	N	-	5
Violaceae	<i>Viola pubescens</i> var. <i>pubescens</i>	Downy Yellow Violet	S5	-	-	N	5	3
Violaceae	<i>Viola sororia</i>	Woolly Blue Violet	S5	-	-	N	4	0
Vitaceae	<i>Parthenocissus vitacea</i>	Thicket Creeper	S5	-	-	N	4	3
Vitaceae	<i>Vitis aestivalis</i>	Summer Grape	S4	-	-	Y	7	3
Vitaceae	<i>Vitis riparia</i>	Riverbank Grape	S5	-	-	N	0	0

Notes:

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³**SARO Status:** Species at Risk in Ontario (Provincial Status as defined by the Endangered Species Act, 2007 as amended).

⁴**COSEWIC Status:** Status as defined by the Committee on the Status of Endangered Wildlife in Canada.

⁵**Regional Significance:** as published by the Regional Municipality of Waterloo. Regional Municipality of Waterloo Listing of Regionally-significant Native Vascular Plants Approved by Regional Council, June, 1999

⁶**Coefficient of Conservatism:** as published by the Natural Heritage Information (Oldham, M.J., Bakowsky, W.d., Surtherland, D.A. 1995. Floristic Quality Assessment System for Southern Ontario. Natural Heritage Information Centre, Ontario Ministry of Natural Resources, Peterborough, Ontario. 69 pp.)

⁷**Coefficient of Wetness:** Coefficient of Wetness reflects a species' affinity for wet soil conditions as published by the Natural Heritage Information hosted by the Ministry of Natural Resources and Forestry / Land Information Ontario.



Endangered Species Act and Species at Risk Act Acronyms

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THR: Threatened

SC: Special Concern

EXT: Extirpated

NAR: Not at Risk

Subnational Rankings (S RANK)

SNR: Unranked

SU: Unrankable – Currently unrankable due to lack of information

SNA: Not applicable – A conservation status rank is not applicable because the species is not a suitable target for conservation activities

S#S#: Range Rank – A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species

?: Indicates uncertainty in the assigned rank

S1: Critically Imperiled – Critically imperiled in the province (often 5 or fewer occurrences)

S2: Imperiled – Imperiled in the province, very few populations (often 20 or fewer),

S3: Vulnerable – Vulnerable in the province, relatively few populations (often 80 or fewer)

S4: Apparently Secure – Uncommon but not rare

S5: Secure – Common, widespread, and abundant in the province

SX: Presumed extirpated

SH: Possibly Extirpated (Historical)

SE: if an element is known to occur as an exotic in Ontario, the status value assigned is SE. A ? qualifier added to that value indicates uncertainty about whether it is exotic or native. Numeric ranks of 1 through 5 added to the exotic status indicates the element's abundance in Ontario, with 1 indicating the least abundant and 5 the most.



Appendix D Wildlife Records



Appendix D.1: Avifauna Records and Observations

Family ¹	Scientific Name ¹	Common Name ¹	S-Rank ²	SARO Status ³	COSEWIC Status ⁴	SARA Status ⁵	Regional Significance (Y/N) ⁶	Source
Accipitridae	<i>Buteo jamaicensis</i>	Red-tailed Hawk	S5	NAR	NAR	-	N	OBBA, eBird, Stantec ^{1,2}
Accipitridae	<i>Haliaeetus leucocephalus</i>	Bald Eagle	S4	SC	NAR	-	N	NHIC
Alcedinidae	<i>Megasceryle alcyon</i>	Belted Kingfisher	S5B, S4N	-	-	-	Y	Stantec ¹
Ardeidae	<i>Ardea herodias</i>	Great Blue Heron	S4	-	-	-	Y	OBBA, eBird, Stantec ²
Bombycillidae	<i>Bombycilla cedrorum</i>	Cedar Waxwing	S5	-	-	-	N	OBBA, eBird, Stantec ^{1,2}
Cardinalidae	<i>Cardinalis cardinalis</i>	Northern Cardinal	S5	-	-	-	N	OBBA, eBird, Stantec ^{1,2}
Cardinalidae	<i>Passerina cyanea</i>	Indigo Bunting	S5B	-	-	-	N	Stantec ¹
Charadriidae	<i>Charadrius vociferus</i>	Killdeer	S4B	-	-	-	N	OBBA, eBird, Stantec ^{1,2}
Columbidae	<i>Columba livia</i>	Rock Pigeon	SNA	-	-	-	N	Stantec ¹
Columbidae	<i>Zenaida macroura</i>	Mourning Dove	S5	-	-	-	N	OBBA, eBird, Stantec ^{1,2}
Corvidae	<i>Corvus brachyrhynchos</i>	American Crow	S5	-	-	-	N	OBBA, eBird, Stantec ^{1,2}
Corvidae	<i>Cyanocitta cristata</i>	Blue Jay	S5	-	-	-	N	OBBA, eBird, Stantec ^{1,2}
Cuculidae	<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo	S4S5B	-	-	-	Y	Stantec ¹
Fringillidae	<i>Spinus tristis</i>	American Goldfinch	S5	-	-	-	N	OBBA, eBird, Stantec ^{1,2}
Fringillidae	<i>Haemorhous mexicanus</i>	House Finch	SNA	-	-	-	N	Stantec ¹
Fringillidae	<i>Coccothraustes vespertinus</i>	Evening Grosbeak	S4	SC	SC	THR	N	iNaturalist
Hirundinidae	<i>Tachycineta bicolor</i>	Tree Swallow	S4S5B	-	-	-	N	Stantec ¹
Hirundinidae	<i>Hirundo rustica</i>	Barn Swallow	S4B	SC	SC	THR	N	iNaturalist, NHIC, Stantec ¹
Hirundinidae	<i>Riparia riparia</i>	Bank Swallow	S4B	THR	THR	THR	N	NHIC
Icteridae	<i>Agelaius phoeniceus</i>	Red-winged Blackbird	S5	-	-	-	N	OBBA, eBird, Stantec ^{1,2}
Icteridae	<i>Icterus galbula</i>	Baltimore Oriole	S4B	-	-	-	N	OBBA, eBird, Stantec ^{1,2}
Icteridae	<i>Molothrus ater</i>	Brown-headed Cowbird	S5	-	-	-	N	OBBA, eBird, Stantec ^{1,2}
Icteridae	<i>Sturnella magna</i>	Eastern Meadowlark	S4B, S3N	THR	THR	THR	N	iNaturalist, NHIC
Icteridae	<i>Dolichonyx oryzivorus</i>	Bobolink	S4B	THR	THR	THR	N	NHIC



Appendix D.1: Avifauna Records and Observations

Family ¹	Scientific Name ¹	Common Name ¹	S-Rank ²	SARO Status ³	COSEWIC Status ⁴	SARA Status ⁵	Regional Significance (Y/N) ⁶	Source
Icteridae	<i>Quiscalus quiscula</i>	Common Grackle	S5	-	-	-	N	Stantec ¹
Laridae	<i>Hydroprogne caspia</i>	Caspian Tern	S3B, S5M	NAR	NAR	-	N	iNaturalist
Laridae	<i>Larus delawarensis</i>	Ring-billed Gull	S5	-	-	-	N	Stantec ¹
Mimidae	<i>Dumetella carolinensis</i>	Gray Catbird	S5B, S3N	-	-	-	N	Stantec ¹
Paridae	<i>Poecile atricapillus</i>	Black-capped Chickadee	S5	-	-	-	N	OBBA, eBird, Stantec ^{1,2}
Parulidae	<i>Geothlypis trichas</i>	Common Yellowthroat	S5B, S3N	-	-	-	N	OBBA, eBird, Stantec ^{1,2}
Parulidae	<i>Setophaga petechia</i>	Yellow Warbler	S5B	-	-	-	N	OBBA, eBird, Stantec ^{1,2}
Parulidae	<i>Setophaga pinus</i>	Pine Warbler	S5B, S3N	-	-	-	Y	Stantec ¹
Parulidae	<i>Seiurus aurocapilla</i>	Ovenbird	S5B	-	-	-	Y	Stantec ¹
Passerellidae	<i>Melospiza melodia</i>	Song Sparrow	S5	-	-	-	N	OBBA, eBird, Stantec ^{1,2}
Passerellidae	<i>Passerculus sandwichensis</i>	Savannah Sparrow	S5B, S3N	-	-	-	N	OBBA, eBird, Stantec ^{1,2}
Passerellidae	<i>Spizella passerina</i>	Chipping Sparrow	S5B, S3N	-	-	-	N	OBBA, eBird, Stantec ^{1,2}
Passerellidae	<i>Ammodramus savannarum</i>	Grasshopper Sparrow	S4B	SC	SC	-	Y	NHIC
Passeridae	<i>Passer domesticus</i>	House Sparrow	SNA	-	-	-	N	OBBA, eBird, Stantec ^{1,2}
Phasianidae	<i>Bonasa umbellus</i>	Ruffed Grouse	S5	-	-	-	N	Stantec ¹
Phasianidae	<i>Meleagris gallopavo</i>	Wild Turkey	S5	-	-	-	N	OBBA, eBird, Stantec ^{1,2}
Picidae	<i>Colaptes auratus</i>	Northern Flicker	S5	-	-	-	N	OBBA, eBird, Stantec ^{1,2}
Picidae	<i>Dryocopus pileatus</i>	Pileated Woodpecker	S5	-	-	-	Y	Stantec ¹
Picidae	<i>Dryobates pubescens</i>	Downy Woodpecker	S5	-	-	-	N	OBBA, eBird, Stantec ^{1,2}
Picidae	<i>Dryobates villosus</i>	Hairy Woodpecker	S5	-	-	-	Y	Stantec ¹
Picidae	<i>Melanerpes carolinus</i>	Red-bellied Woodpecker	S5	-	-	-	Y	OBBA, eBird, Stantec ^{1,2} , iNaturalist
Picidae	<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	S3	END	END	END	Y	NHIC
Sittidae	<i>Sitta carolinensis</i>	White-breasted Nuthatch	S5	-	-	-	N	OBBA, eBird, Stantec ^{1,2}
Sturnidae	<i>Sturnus vulgaris</i>	European Starling	SNA	-	-	-	N	OBBA, eBird, Stantec ^{1,2}



Appendix D.1: Avifauna Records and Observations

Family ¹	Scientific Name ¹	Common Name ¹	S-Rank ²	SARO Status ³	COSEWIC Status ⁴	SARA Status ⁵	Regional Significance (Y/N) ⁶	Source
Troglodytidae	<i>Troglodytes aedon</i>	House Wren	S5B	-	-	-	N	OBBA, eBird, Stantec ^{1,2}
Troglodytidae	<i>Troglodytes hiemalis</i>	Winter Wren	S5B, S4N	-	-	-	Y	Stantec ¹
Turdidae	<i>Turdus migratorius</i>	American Robin	S5	-	-	-	N	OBBA, eBird, Stantec ^{1,2}
Turdidae	<i>Hylocichla mustelina</i>	Wood Thrush	S4B	SC	THR	THR	N	NHIC, Stantec ¹
Tyrannidae	<i>Contopus virens</i>	Eastern Wood-Pewee	S4B	SC	SC	SC	N	NHIC, OBBA, eBird, Stantec ^{1,2}
Tyrannidae	<i>Empidonax traillii</i>	Willow Flycatcher	S4B	-	-	-	Y	OBBA, eBird, Stantec ^{1,2}
Tyrannidae	<i>Myiarchus crinitus</i>	Great Crested Flycatcher	S5B	-	-	-	N	OBBA, eBird, Stantec ^{1,2}
Tyrannidae	<i>Tyrannus tyrannus</i>	Eastern Kingbird	S4B	-	-	-	N	OBBA, eBird, Stantec ^{1,2}
Vireonidae	<i>Vireo gilvus</i>	Warbling Vireo	S5B	-	-	-	Y	Stantec ¹
Vireonidae	<i>Vireo olivaceus</i>	Red-eyed Vireo	S5B	-	-	-	N	OBBA, eBird, Stantec ^{1,2}

Notes:

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¹**Scientific Name:** The scientific name of a species as published by the Natural Heritage Information Centre hosted by the Ministry of Natural Resources and Forestry / Land Information Ontario.

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⁷**Regional Significance:** Species that qualify as Locally Significant in the Region of Waterloo.



Appendix D.1: Avifauna Records and Observations

References:

NHIC: Natural Heritage Information Centre database review (Ministry of Northern Development, Mines, Natural Resources and Forestry / Land Information Ontario).

OBBA: Cadman, M. D., D.A. Sutherland, G.G. Beck, D. Lepage, A.R. Couturier. 2007. Atlas of the Breeding Birds of Ontario, 2001-2005. (eds) Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of natural resources, and Ontario Nature, Toronto, xxii + 318pp

eBird: eBird species observation database. Available Online: <https://eBird.org/map>

iNaturalist: Ontario Mammals Project. Atlas Area Search: Durham Region. Retrieved April 2023 from <https://www.inaturalist.org/guides/1327>.

Stantec¹: Environmental Impact Study Rural East District Lands City of Waterloo, File No. 160310788. Prepared by Stantec, June 2008.

Stantec²: Stantec 2023 field program as described in Section 3.3

Endangered Species Act and Species at Risk Act Acronyms

END: Endangered

THR: Threatened

SC: Special Concern

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Subnational Rankings (S-Rank)

SNA: Not applicable – A conservation status rank is not applicable because the species is not a suitable target for conservation activities

S#S#: Range Rank – A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species

S3: Vulnerable – Vulnerable in the province, relatively few populations (often 80 or fewer)

S4: Apparently Secure – Uncommon but not rare

S5: Secure – Common, widespread, and abundant in the province

Global Rank (G-Rank)

G5: Very common globally; demonstrably secure



Appendix D.2: Herpetofauna Records and Observations

Family ¹	Scientific Name ¹	Common Name ¹	S-Rank ²	SARO Status ³	COSEWIC Status ⁴	SARA Status ⁵	Regional Significance (Y/N) ⁷	Source
Ambystomatidae	<i>Ambystoma maculatum</i>	Spotted Salamander	S4	-	-	-	N	ORAA
Bufonidae	<i>Anaxyrus americanus</i>	American Toad	S5	-	-	-	N	ORAA, Stantec
Chelydridae	<i>Chelydra serpentina</i>	Snapping Turtle	S4	SC	SC	SC	N	NHIC, ORAA, iNaturalist
Colubridae	<i>Lampropeltis triangulum</i>	Eastern Milksnake	S4	NAR	SC	SC	N	ORAA
Colubridae	<i>Storeria occipitomaculata</i>	Red-bellied Snake	S5	-	-	-	N	ORAA
Colubridae	<i>Storeria dekayi</i>	DeKay's Brownsnake	S5	NAR	NAR	-	N	ORAA
Colubridae	<i>Thamnophis sirtalis sirtalis</i>	Eastern Gartersnake	S5	-	-	-	N	ORAA
Colubridae	<i>Opheodrys vernalis</i>	Smooth Greensnake	S4	-	-	-	N	ORAA
Emydidae	<i>Graptemys geographica</i>	Northern Map Turtle	S3	SC	SC	SC	N	ORAA
Emydidae	<i>Chrysemys picta marginata</i>	Midland Painted Turtle	S4	-	SC	SC	N	ORAA
Emydidae	<i>Emydoidea blandingii</i>	Blanding's Turtle	S3	THR	END	-	N	ORAA
Hylidae	<i>Pseudacris maculata pop. 1</i>	Western Chorus Frog - Great Lakes - St. Lawrence - Canadian Shield population	S4	NAR	THR	THR	N	NHIC, ORAA
Hylidae	<i>Dryophytes versicolor</i>	Gray Treefrog	S5	-	-	-	N	ORAA
Hylidae	<i>Pseudacris triseriata</i>	Western Chorus Frog	S4	-	-	-	N	ORAA
Hylidae	<i>Pseudacris crucifer</i>	Spring Peeper	S5	-	-	-	N	ORAA, Stantec
Plethodontidae	<i>Plethodon cinereus</i>	Eastern Red-backed Salamander	S5	-	-	-	N	ORAA
Proteidae	<i>Necturus maculosus</i>	Mudpuppy	S4	NAR	NAR	-	N	ORAA
Ranidae	<i>Lithobates catesbeianus</i>	American Bullfrog	S4	-	-	-	N	ORAA
Ranidae	<i>Lithobates clamitans</i>	Green Frog	S5	-	-	-	N	ORAA, Stantec
Ranidae	<i>Lithobates pipiens</i>	Northern Leopard Frog	S5	NAR	NAR	-	N	ORAA, iNaturalist, Stantec
Ranidae	<i>Lithobates sylvaticus</i>	Wood Frog	S5	-	-	-	N	ORAA, Stantec
Salamandridae	<i>Notophthalmus viridescens viridescens</i>	Red-spotted Newt	S5	-	-	-	N	ORAA



Appendix D.2: Herpetofauna Records and Observations

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ORAA: Ontario Reptile and Amphibian Atlas, Ontario Nature.

Stantec: Environmental Impact Study Rural East District Lands City of Waterloo, File No. 160310788. Prepared by Stantec, June 2008.

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?: Indicates uncertainty in the assigned rank

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S2: Imperiled – Imperiled in the province, very few populations (often 20 or fewer),

S3: Vulnerable – Vulnerable in the province, relatively few populations (often 80 or fewer)

S4: Apparently Secure – Uncommon but not rare



Appendix D.2: Herpetofauna Records and Observations

S5: Secure – Common, widespread, and abundant in the province

SX: Presumed extirpated

SH: Possibly Extirpated (Historical)

Global Rank (G-Rank)

G1G2: Extremely rare to very rare globally

G2: Very rare globally; usually between 5-10 occurrences in the overall range

G2G3: Very rare to uncommon globally

G3: Rare to uncommon globally; usually between 20-100 occurrences

G3G4: Rare to common globally

G4: Common globally; usually more than 100 occurrences in the overall range

G4G5: Common to very common globally

G5: Very common globally; demonstrably secure

GU: Status uncertain, often because of low search effort or cryptic nature of the species; more data needed.

GNR: Unranked—Global rank not yet assessed.



Appendix D.3: Mammalian Records and Observations

Family ¹	Scientific Name ¹	Common Name ¹	S-Rank ²	SARO Status ³	COSEWIC Status ⁴	SARA Status ⁵	Regional Significance (Y/N) ⁷	Source
Cervidae	<i>Odocoileus virginianus</i>	White-tailed Deer	S5	-	-	-	N	Stantec ^{1,2}
Leporidae	<i>Sylvilagus floridanus</i>	Eastern Cottontail	S5	-	-	-	N	Stantec ¹
Procyonidae	<i>Procyon lotor</i>	Northern Raccoon	S5	-	-	-	N	Stantec ¹
Sciuridae	<i>Tamias striatus</i>	Eastern Chipmunk	S5	-	-	-	N	Stantec ¹
Sciuridae	<i>Sciurus carolinensis</i>	Grey Squirrel	S5	-	-	-	N	Stantec ¹
Vespertilionidae	<i>Myotis leibii</i>	Eastern Small-footed Myotis	S2S3	END	-	-	N	MNRF
Vespertilionidae	<i>Myotis lucifugus</i>	Little Brown Myotis	S4	END	END	END	N	MNRF
Vespertilionidae	<i>Myotis septentrionalis</i>	Northern Myotis	S3?	END	END	END	N	MNRF
Vespertilionidae	<i>Perimyotis subflavus</i>	Tri-colored Bat	S3?	END	END	END	N	MNRF

Notes:

¹**Family Name:** The Family name of a species as published by the Natural Heritage Information Centre hosted by the Ministry of Northern Development, Mines, Natural Resources and Forestry / Land Information Ontario.

¹**Scientific Name:** The scientific name of a species as published by the Natural Heritage Information Centre hosted by the Ministry of Northern Development, Mines, Natural Resources and Forestry / Land Information Ontario.

¹**Common Name:** The common English name of a species as published by the Natural Heritage Information Centre hosted by the Ministry of Northern Development, Mines, Natural Resources and Forestry / Land Information Ontario.

²**S-Rank:** Subnational Rank (S-Rank) is the conservation status of a species or plant community within a particular province, territory, or state. In this scenario, it is the provincial-level ranking system as published by the Natural Heritage Information Centre hosted by the Ministry of Northern Development, Mines, Natural Resources and Forestry / Land Information Ontario.

³**SARO Status:** Species at Risk in Ontario (Provincial Status as defined by the Endangered Species Act, 2007 as amended).

⁴**COSEWIC Status:** Status as defined by the Committee on the Status of Endangered Wildlife in Canada.

⁵**SARA Status:** Federal status as defined by the Species at Risk Act.

⁶**G-Rank:** Global Rank (G-Rank) is the conservation status of a species or plant community across its entire range. These values were derived from the Natural Heritage Information Centre hosted by the Ministry of Northern Development, Mines, Natural Resources and Forestry / Land Information Ontario.

⁷**Regional Significance:** Species that qualify as Locally Significant in the Region of Waterloo.



Appendix D.3: Mammalian Records and Observations

References:

NHIC: Natural Heritage Information Centre database review (Ministry of Northern Development, Mines, Natural Resources and Forestry / Land Information Ontario).

MNRF: Dobbyn, J.S. 1994. Atlas of the Mammals of Ontario. Federation of Ontario Naturalists, Don Mills, Ontario, 120 pp.

Stantec¹: Environmental Impact Study Rural East District Lands City of Waterloo, File No. 160310788. Prepared by Stantec, June 2008.

Stantec²: Stantec 2023 field program as described in Section 3.3

Endangered Species Act and Species at Risk Act Acronyms

END: Endangered

THR: Threatened

SC: Special Concern

EXT: Extirpated

NAR: Not at Risk

Subnational Rankings (S-Rank)

SNR: Unranked

SU: Unrankable – Currently unrankable due to lack of information

SNA: Not applicable – A conservation status rank is not applicable because the species is not a suitable target for conservation activities

S#S#: Range Rank – A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species

?: Indicates uncertainty in the assigned rank

S1: Critically Imperiled – Critically imperiled in the province (often 5 or fewer occurrences)

S2: Imperiled – Imperiled in the province, very few populations (often 20 or fewer),

S3: Vulnerable – Vulnerable in the province, relatively few populations (often 80 or fewer)

S4: Apparently Secure – Uncommon but not rare

S5: Secure – Common, widespread, and abundant in the province

SX: Presumed extirpated

SH: Possibly Extirpated (Historical)

Global Rank (G-Rank)

G1G2: Extremely rare to very rare globally

G2: Very rare globally; usually between 5-10 occurrences in the overall range

G2G3: Very rare to uncommon globally

G3: Rare to uncommon globally; usually between 20-100 occurrences

G3G4: Rare to common globally

G4: Common globally; usually more than 100 occurrences in the overall range

G4G5: Common to very common globally

G5: Very common globally; demonstrably secure

GU: Status uncertain, often because of low search effort or cryptic nature of the species; more data needed.

GNR: Unranked—Global rank not yet assessed.



Appendix D.4: Insect Records and Observations

Family ¹	Scientific Name ¹	Common Name ¹	S-Rank ²	SARO Status ³	COSEWIC Status ⁴	SARA Status ⁵	Regional Significance (Y/N) ⁷	Source
Erebidae	<i>Apantesis arge</i>	Arge Moth	S4, S5	-	-	-	N	ETA
Erebidae	<i>Apantesis phalerata</i>	Harnessed Tiger Moth	S4	-	-	-	N	ETA
Erebidae	<i>Apantesis virguncula</i>	Little Virgin Tiger Moth	S4, S5	-	-	-	N	ETA
Erebidae	<i>Catocala amatrix</i>	Sweetheart Underwing Moth	S4	-	-	-	N	ETA
Erebidae	<i>Catocala grynea</i>	Woody Underwing Moth	S4	-	-	-	N	ETA
Erebidae	<i>Catocala ilia</i>	Ilia Underwing Moth	S4	-	-	-	N	ETA
Erebidae	<i>Catocala innubens</i>	Betrothed Underwing Moth	S3	-	-	-	N	ETA
Erebidae	<i>Catocala minuta</i>	Little Underwing Moth	S3				N	ETA
Erebidae	<i>Catocala neogama</i>	Bride Underwing Moth	S4, S5	-	-	-	N	ETA
Erebidae	<i>Catocala palaeogama</i>	Oldwife Underwing Moth	S3	-	-	-	N	ETA
Erebidae	<i>Catocala parta</i>	Mother Underwing Moth	S4, S5	-	-	-	N	ETA
Erebidae	<i>Catocala piatrix</i>	Penitent Underwing Moth	S3	-	-	-	N	ETA
Erebidae	<i>Cisseps fulvicollis</i>	Yellow-collared Scape Moth	S5	-	-	-	N	ETA
Erebidae	<i>Ctenucha virginica</i>	Virginia Ctenucha Moth	S5	-	-	-	N	ETA
Erebidae	<i>Cycnia oregonensis</i>	Oregon Cycnia Moth	S4	-	-	-	N	ETA
Erebidae	<i>Cycnia tenera</i>	Delicate Cycnia Moth	S4	-	-	-	N	ETA
Erebidae	<i>Estigmene acrea</i>	Salt Marsh Moth	S4, S5	-	-	-	N	ETA
Erebidae	<i>Euchaetes egle</i>	Milkweed Tussock Moth	S4	-	-	-	N	ETA
Erebidae	<i>Halysidota tessellaris</i>	Banded Tussock Moth	S5	-	-	-	N	ETA
Erebidae	<i>Haploa clymene</i>	Clymene Moth	S3, S4	-	-	-	N	ETA
Erebidae	<i>Haploa confusa</i>	Confused Haploa Moth	S4, S5	-	-	-	N	ETA
Erebidae	<i>Haploa lecontei</i>	Leconte's Haploa Moth	S5?	-	-	-	N	ETA
Erebidae	<i>Hypercompe scribonia</i>	Giant Leopard Moth	S3, S4	-	-	-	N	ETA
Erebidae	<i>Hyphantria cunea</i>	Fall Webworm Moth	S5	-	-	-	N	ETA
Erebidae	<i>Hypoprepia fucosa</i>	Painted Lichen Moth	S5?	-	-	-	N	ETA



Appendix D.4: Insect Records and Observations

Family ¹	Scientific Name ¹	Common Name ¹	S-Rank ²	SARO Status ³	COSEWIC Status ⁴	SARA Status ⁵	Regional Significance (Y/N) ⁷	Source
Erebidae	<i>Lophocampa caryae</i>	Hickory Tussock Moth	S5	-	-	-	N	ETA
Erebidae	<i>Lophocampa maculata</i>	Spotted Tussock Moth	S5	-	-	-	N	ETA
Erebidae	<i>Phragmatobia fuliginosa</i>	Ruby Tiger Moth	S5?	-	-	-	N	ETA
Erebidae	<i>Pyrrharctia isabella</i>	Isabella Tiger Moth	S5	-	-	-	N	ETA
Erebidae	<i>Spilosoma congrua</i>	Agreeable Tiger Moth	S5?	-	-	-	N	ETA
Erebidae	<i>Spilosoma virginica</i>	Virginia Tiger Moth	S5	-	-	-	N	ETA
Hepialidae	<i>Korscheltellus lupulina</i>	Common Swift	-	-	-	-	N	TEA
Hesperiidae	<i>Anatrytone logan</i>	Delaware Skipper	S4	-	-	-	N	OBA
Hesperiidae	<i>Ancyloxypha numitor</i>	Least Skipper	S5	-	-	-	N	OBA
Hesperiidae	<i>Carterocephalus palaemon</i>	Arctic Skipper	S5	-	-	-	N	OBA
Hesperiidae	<i>Epargyreus clarus</i>	Silver-spotted Skipper	S4	-	-	-	N	OBA
Hesperiidae	<i>Erynnis baptisiae</i>	Wild Indigo Duskywing	S4	-	-	-	N	OBA
Hesperiidae	<i>Erynnis icelus</i>	Dreamy Duskywing	S5	-	-	-	N	OBA
Hesperiidae	<i>Erynnis juvenalis</i>	Juvenal's Duskywing	S5	-	-	-	N	OBA
Hesperiidae	<i>Euphyes vestris</i>	Dun Skipper	S5	-	-	-	N	OBA
Hesperiidae	<i>Hylephila phyleus</i>	Fiery Skipper	SNA	-	-	-	N	OBA
Hesperiidae	<i>Poanes hobomok</i>	Hobomok Skipper	S5	-	-	-	N	OBA
Hesperiidae	<i>Poanes viator</i>	Broad-winged Skipper	S4	-	-	-	N	OBA
Hesperiidae	<i>Polites mystic</i>	Long Dash Skipper	S5	-	-	-	N	OBA
Hesperiidae	<i>Polites peckius</i>	Peck's Skipper	S5	-	-	-	N	OBA
Hesperiidae	<i>Polites themistocles</i>	Tawny-edged skipper	S5	-	-	-	N	OBA
Hesperiidae	<i>Polites themistocles</i>	Tawny-edged Skipper	S5	-	-	-	N	OBA
Hesperiidae	<i>Pompeius verna</i>	Little Glassywing	S4	-	-	-	N	OBA
Hesperiidae	<i>Thymelicus lineola</i>	European Skipper	SNA	-	-	-	N	OBA
Hesperiidae	<i>Wallengrenia egeremet</i>	Northern Broken-Dash	S5	-	-	-	N	OBA
Lasiocampidae	<i>Malacosoma americana</i>	Eastern Tent Caterpillar Moth	S5	-	-	-	N	OBA



Appendix D.4: Insect Records and Observations

Family ¹	Scientific Name ¹	Common Name ¹	S-Rank ²	SARO Status ³	COSEWIC Status ⁴	SARA Status ⁵	Regional Significance (Y/N) ⁷	Source
Lasiocampidae	<i>Malacosoma disstria</i>	Forest Tent Caterpillar Moth	S5	-	-	-	N	OBA
Lasiocampidae	<i>Tolyte laricis</i>	Larch Tolyte Moth	S5	-	-	-	N	OBA
Lycaenidae	<i>Celastrina lucia</i>	Northern Azure	S5	-	-	-	N	OBA
Lycaenidae	<i>Celastrina neglecta</i>	Summer Azure	S5	-	-	-	N	OBA
Lycaenidae	<i>Cupido comyntas</i>	Eastern Tailed Blue	S5	-	-	-	N	OBA
Lycaenidae	<i>Glaucopsyche lygdamus</i>	Silvery Blue	S5	-	-	-	N	OBA
Lycaenidae	<i>Lycaena hyllus</i>	Bronze Copper	S5	-	-	-	N	OBA
Lycaenidae	<i>Lycaena phlaeas</i>	American Copper	S5	-	-	-	N	OBA
Lycaenidae	<i>Satyrrium acadica</i>	Acadian Hairstreak	S4	-	-	-	N	OBA
Lycaenidae	<i>Satyrrium calanus</i>	Banded Hairstreak	S4	-	-	-	N	OBA
Lycaenidae	<i>Satyrrium liparops</i>	Striped Hairstreak	S5	-	-	-	N	OBA
Lycaenidae	<i>Strymon melinus</i>	Gray Hairstreak	S4	-	-	-	N	OBA
Notodontidae	<i>Clostera apicalis</i>	Apical Prominent Moth	S5	-	-	-	N	ETA
Notodontidae	<i>Datana integerrima</i>	Walnut Caterpillar Moth	S3, S4	-	-	-	N	ETA
Notodontidae	<i>Gluphisia septentrionis</i>	Common Gluphisia Moth	S5	-	-	-	N	ETA
Notodontidae	<i>Heterocampa guttivitta</i>	Saddled Prominent Moth	S5	-	-	-	N	ETA
Notodontidae	<i>Heterocampa guttivitta</i>	Saddled Prominent Moth	S5	-	-	-	N	ETA
Notodontidae	<i>Pheosia rimosa</i>	Black-rimmed Prominent Moth	S5	-	-	-	N	ETA
Notodontidae	<i>Schizura unicornis</i>	Unicorn Caterpillar Moth	S5	-	-	-	N	ETA
Nymphalidae	<i>Aglais milberti</i>	Milbert's Tortoiseshell	S5	-	-	-	N	OBA
Nymphalidae	<i>Asterocampa clyton</i>	Tawny Emperor	S3	-	-	-	N	OBA
Nymphalidae	<i>Cercyonis pegala</i>	Common Wood-Nymph	S5	-	-	-	N	OBA
Nymphalidae	<i>Coenonympha californica</i>	Common Ringlet	S5	-	-	-	N	OBA
Nymphalidae	<i>Danaus plexippus</i>	Monarch	S2N, S4B	SC	END	SC	N	OBA, iNaturalist
Nymphalidae	<i>Euphydryas phaeton</i>	Baltimore Checkerspot	S4	-	-	-	N	OBA



Appendix D.4: Insect Records and Observations

Family ¹	Scientific Name ¹	Common Name ¹	S-Rank ²	SARO Status ³	COSEWIC Status ⁴	SARA Status ⁵	Regional Significance (Y/N) ⁷	Source
Nymphalidae	<i>Euptoieta claudia</i>	Variegated Fritillary	SNA	-	-	-	N	OBA
Nymphalidae	<i>Junonia coenia</i>	Common Buckeye	SNA	-	-	-	N	OBA
Nymphalidae	<i>Lethe anthedon</i>	Northern Pearly-Eye	S5	-	-	-	N	OBA
Nymphalidae	<i>Lethe appalachia</i>	Appalachian Brown	S4	-	-	-	N	OBA
Nymphalidae	<i>Lethe eurydice</i>	Eyed Brown	S5	-	-	-	N	OBA
Nymphalidae	<i>Libytheana carinenta</i>	American Snout	SNA	-	-	-	N	OBA
Nymphalidae	<i>Limenitis archippus</i>	Viceroy	S5	-	-	-	N	OBA
Nymphalidae	<i>Limenitis arthemis arthemis</i>	White Admiral	S5	-	-	-	N	OBA
Nymphalidae	<i>Limenitis arthemis astyanax</i>	Red-spotted Purple	S5	-	-	-	N	OBA
Nymphalidae	<i>Megisto cymela</i>	Little Wood-Satyr	S5	-	-	-	N	OBA
Nymphalidae	<i>Nymphalis antiopa</i>	Mourning Cloak	S5	-	-	-	N	OBA
Nymphalidae	<i>Nymphalis l-album</i>	Compton Tortoiseshell	S5	-	-	-	N	OBA
Nymphalidae	<i>Phyciodes cocyta</i>	Northern Crescent	S5	-	-	-	N	OBA
Nymphalidae	<i>Phyciodes tharos</i>	Pearl Crescent	S4	-	-	-	N	OBA
Nymphalidae	<i>Polygonia comma</i>	Eastern Comma	S5	-	-	-	N	OBA
Nymphalidae	<i>Polygonia interrogationis</i>	Question Mark	S5	-	-	-	N	OBA
Nymphalidae	<i>Polygonia progne</i>	Gray Comma	S5	-	-	-	N	OBA
Nymphalidae	<i>Speyeria cybele</i>	Great Spangled Fritillary	S5	-	-	-	N	OBA
Nymphalidae	<i>Vanessa atalanta</i>	Red Admiral	S5B	-	-	-	N	OBA
Nymphalidae	<i>Vanessa cardui</i>	Painted Lady	S5B	-	-	-	N	OBA
Nymphalidae	<i>Vanessa virginiensis</i>	American Lady	S5	-	-	-	N	OBA
Papilionidae	<i>Battus philenor</i>	Pipevine Swallowtail	SNA	-	-	-	N	OBA
Papilionidae	<i>Papilio canadensis</i>	Canadian Tiger Swallowtail	S5	-	-	-	N	OBA
Papilionidae	<i>Papilio canadensis x glaucus</i>	Midsummer Tiger Swallowtail	-	-	-	-	N	OBA
Papilionidae	<i>Papilio cresphontes</i>	Eastern Giant Swallowtail	-	-	-	-	N	OBA



Appendix D.4: Insect Records and Observations

Family ¹	Scientific Name ¹	Common Name ¹	S-Rank ²	SARO Status ³	COSEWIC Status ⁴	SARA Status ⁵	Regional Significance (Y/N) ⁷	Source
Papilionidae	<i>Papilio glaucus</i>	Eastern Tiger Swallowtail	S5	-	-	-	N	OBA
Papilionidae	<i>Papilio glaucus complex</i>	Tiger Swallowtail Complex	-	-	-	-	N	OBA
Papilionidae	<i>Papilio polyxenes</i>	Black Swallowtail	S5	-	-	-	N	OBA
Papilionidae	<i>Papilio troilus</i>	Spicebush Swallowtail	S4	-	-	-	N	OBA
Pieridae	<i>Colias eurytheme</i>	Orange Sulphur	S5	-	-	-	N	OBA
Pieridae	<i>Colias philodice</i>	Clouded Sulphur	S5	-	-	-	N	OBA
Pieridae	<i>Pieris oleracea</i>	Mustard White	S4	-	-	-	N	OBA
Pieridae	<i>Pieris rapae</i>	Cabbage White	SNA	-	-	-	N	OBA
Saturniidae	<i>Antheraea polyphemus</i>	Polyphemus Moth	S5	-	-	-	N	OBA
Saturniidae	<i>Antheraea polyphemus</i>	Polyphemus Moth	S5	-	-	-	N	ETA
Saturniidae	<i>Hyalophora cecropia</i>	Cecropia Moth	S4, S5	-	-	-	N	OBA
Sphingidae	<i>Ceratomia undulosa</i>	Waved Sphinx Moth	S5	-	-	-	N	OBA
Sphingidae	<i>Darapsa myron</i>	Virginia Creeper Sphinx Moth	S4, S5	-	-	-	N	ETA
Sphingidae	<i>Deidamia inscripta</i>	Lettered Sphinx	S4, S5	-	-	-	N	ETA
Sphingidae	<i>Eumorpha pandorus</i>	Pandorus Sphinx Moth	S5	-	-	-	N	ETA
Sphingidae	<i>Hemaris diffinis</i>	Snowberry Clearwing Moth	S4S5	-	-	-	N	ETA
Sphingidae	<i>Hemaris thysbe</i>	Hummingbird Clearwing Moth	S5	-	-	-	N	ETA
Sphingidae	<i>Hyles gallii</i>	Gallium Sphinx Moth	S5?	-	-	-	N	ETA
Sphingidae	<i>Paonias excaecata</i>	Blind-eyed Sphinx Moth	S5	-	-	-	N	ETA
Sphingidae	<i>Paonias myops</i>	Small-eyed Sphinx Moth	S5	-	-	-	N	ETA
Sphingidae	<i>Smerinthus jamaicensis</i>	Twin-spotted Sphinx Moth	S5	-	-	-	N	ETA
Sphingidae	<i>Sphecodina abbottii</i>	Abbot's Sphinx Moth	S5?	-	-	-	N	ETA
Sphingidae	<i>Sphinx chersis</i>	Great Ash Sphinx Moth	S4	-	-	-	N	OBA



Appendix D.4: Insect Records and Observations

Notes:

¹**Family Name:** The Family name of a species as published by the Natural Heritage Information Centre hosted by the Ministry of Northern Development, Mines, Natural Resources and Forestry / Land Information Ontario.

¹**Scientific Name:** The scientific name of a species as published by the Natural Heritage Information Centre hosted by the Ministry of Northern Development, Mines, Natural Resources and Forestry / Land Information Ontario.

¹**Common Name:** The common English name of a species as published by the Natural Heritage Information Centre hosted by the Ministry of Northern Development, Mines, Natural Resources and Forestry / Land Information Ontario.

²**S-Rank:** Subnational Rank (S-Rank) is the conservation status of a species or plant community within a particular province, territory, or state. In this scenario, it is the provincial level ranking system as published by the Natural Heritage Information Centre hosted by the Ministry of Northern Development, Mines, Natural Resources and Forestry / Land Information Ontario.

³**SARO Status:** Species at Risk in Ontario (Provincial Status as defined by the Endangered Species Act, 2007 as amended).

⁴**COSEWIC Status:** Status as defined by the Committee on the Status of Endangered Wildlife in Canada.

⁵**SARA Status:** Federal status as defined by the Species at Risk Act.

⁶**G-Rank:** Global Rank (G-Rank) is the conservation status of a species or plant community across its entire range. These values were derived from the Natural Heritage Information Centre hosted by the Ministry of Northern Development, Mines, Natural Resources and Forestry / Land Information Ontario.

⁷**Regional Significance:** Species that qualify as Locally Significant in the Region of Waterloo.

References:

TEA: Ontario Butterfly Atlas database review as published by the Toronto Entomologists' Association (TEA). Retrieved May 2023 from <https://www.ontarioinsects.org/atlas/>

OBA: Ontario Moth Atlas database review as published by the Toronto Entomologists' Association (TEA). Retrieved May 2023 from [Ontario Moth Atlas \(ontarioinsects.org\)](https://www.ontarioinsects.org/)

iNaturalist: Ontario Mammals Project. Atlas Area Search: Durham Region. Retrieved April 2023 from <https://www.inaturalist.org/guides/1327>.

Stantec: Observed in the Study Area by Stantec in 2023

Endangered Species Act and Species at Risk Act Acronyms

END: Endangered

THR: Threatened

SC: Special Concern

EXT: Extirpated

NAR: Not at Risk



Appendix D.4: Insect Records and Observations

Subnational Rankings (S-Rank)

SNR: Unranked

SU: Unrankable – Currently unrankable due to lack of information

SNA: Not applicable – A conservation status rank is not applicable because the species is not a suitable target for conservation activities

S#S#: Range Rank – A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species

?: Indicates uncertainty in the assigned rank

S1: Critically Imperiled – Critically imperiled in the province (often 5 or fewer occurrences)

S2: Imperiled – Imperiled in the province, very few populations (often 20 or fewer),

S3: Vulnerable – Vulnerable in the province, relatively few populations (often 80 or fewer)

S4: Apparently Secure – Uncommon but not rare

S5: Secure – Common, widespread, and abundant in the province

SX: Presumed extirpated

SH: Possibly Extirpated (Historical)

Global Rankings (G-Rank)

G1: Extremely rare globally – usually fewer than 5 occurrences in the overall range

G1G2: Extremely rare to very rare globally

G2: Very rare globally – usually between 5-10 occurrences in the overall range

G2G3: Very rare to uncommon globally

G3: Rare to uncommon globally – usually between 20-100 occurrences

G3G4: Rare to common globally

G4: Common globally – usually more than 100 occurrences in the overall range

G4G5: Common to very common globally

G5: Very common globally – demonstrably secure

GU: Status uncertain, often because of low search effort or cryptic nature of the species – more data needed

GNR: Unranked – Global rank not yet assessed.

T: Denotes that the rank applies to a subspecies or variety

Q: Denotes that the taxonomic status of the species, subspecies, or variety is questionable



Appendix E SAR and SOCC Habitat Screening Assessment



Appendix E.1: Species at Risk Habitat Screening Assessment

Group	Common Name ¹	Scientific Name ²	SARO ³	COSEWIC ⁴	SARA ⁵	S-Rank ⁶	Source(s)	Habitat Description	Probability of Occurrence in the Study Area (Low, Medium, or High)
Avifauna	Bobolink	<i>Dolichonyx oryzivorus</i>	THR	SC	THR	S4B	NHIC	Bobolink nest primarily in forage crops with a mixture of grasses and broad-leaved forbs, predominantly hayfields and pastures. Preferred ground cover species include grasses such as Timothy and Kentucky bluegrass and forbs such as clover and dandelion (COSEWIC 2022). Bobolink is an area-sensitive species, with reported lower reproductive success in small habitat fragments (COSEWIC 2022).	Low – Suitable Habitat for Bobolink was observed in the Study Area. Bobolink was not observed in the Study Area during the breeding bird survey (3 site visits).
Avifauna	Eastern Meadowlark	<i>Sturnella magna</i>	THR	THR	THR	S4B, S3N	NHIC, iNaturalist	Meadowlarks are ground nesting birds (Harrison, 1975), which are often associated with human-modified habitats where they sing from prominent perches such as roadside wires, trees, and fenceposts. As a grassland species, the Eastern Meadowlark typically occurs in meadows, hayfields, and pastures. However, it will utilize a wider range of habitat than most grassland species, including mown lawns (e.g., golf course, parks), wooded city ravines, young conifer plantations and orchards (COSEWIC 2023). The Eastern Meadowlark is generally tolerant of habitat with an early succession of trees or shrubs.	Low – Suitable Habitat for Eastern Meadowlark was observed in the Study Area. Eastern Meadowlark was not observed in the Study Area during the breeding bird survey (3 site visits).
Avifauna	Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	END	END	END	S3	NHIC	The Red-headed Woodpecker occupies a wide range of habitats, but most are characterized by open areas for feeding, snags for roosting, and a secure food supply. This species requires multiple snags for nesting, roosting, and foraging. Some of the habitats used are open deciduous and riparian woodlands, orchards, parks, agricultural lands, savanna-like grasslands, beaver ponds with snags, forest edges, burned forests, and flooded bottomland forests. Habitats are similar in both breeding and wintering range, but winter distribution most determined by presence of food. Have been known to move north in winter if mast is heavy.	Low – Suitable Habitat for Red-headed Woodpecker was observed in the Study Area. Red-headed Woodpecker was not observed in the Study Area during the breeding bird survey (3 site visits).
Avifauna	Bank Swallow	<i>Riparia riparia</i>	THR	THR	THR	S4B	NHIC	The Bank Swallow is ranked as S4B (apparently secure breeding status) in Ontario and is designated provincially as threatened (June 2014). This species receives general habitat protection under the ESA (2007). The Bank Swallow excavate nests in exposed earth banks along watercourses and lakeshores, roadsides, stockpiles of soil, and the sides of sand and gravel pits. Single nests may occur, although colonies are typical and range from two to several thousand. Adjacent grasslands and watercourses are used for foraging habitat (Cadman et al., 2007).	Low – Suitable habitat for Bank Swallow was not observed in the Study Area. Bank Swallow was not observed in the Study Area during the breeding bird survey (3 site visits).
Reptile	Blanding's Turtle	<i>Emydoidea blandingi</i>	THR	THR	THR	S3	ORAA	Blanding's Turtles frequent lakes, ponds, and marshes and prefer shallow water with abundant aquatic vegetation and a soft bottom. They prefer shallow water that is rich in nutrients, organic soil, and dense vegetation. Adults usually occupy open or partially vegetated sites, whereas juveniles occupy areas with thick aquatic vegetation including sphagnum, water lilies and algae. Nesting occurs in dry conifer or mixed hardwood forests, up to 410 m from any body of water, in loose substrates including sand, organic soil, gravel and cobblestone, nesting may also occur along gravel roadways (COSEWIC, 2023).	Medium – Suitable Habitat for Blanding's Turtle was observed in the Study Area. The species was not observed in the Study Area during the field program. No targeted turtle surveys were completed as part of the field program.
Mammals	Little Brown Myotis	<i>Myotis lucifugus</i>	END	END	END	S4	iNaturalist, MNRF	This species up until recently was considered the most common bat species in Ontario, and most frequently found bat species in North America. The recent change in status is due to significant declines in recent years attributed to a condition referred to as White-nose Syndrome (WNS). A widespread species, the Little Brown Bat is commonly found in warm sites such as buildings, attics, roof crevices, under bridges or in cavities of canopy trees in the forest (COSEWIC, 2023).	Medium – Potential habitat for Little Brown Myotis was observed in the Study Area. Little Brown Myotis was not observed during the field program. No targeted bat surveys were completed as part of the field program.
Mammals	Eastern Small-footed Myotis	<i>Myotis leibii</i>	END	Not listed	END	S2S3	MNRF	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius; Maternal Roosts: primarily under loose rocks on exposed rock outcrops, crevices, and cliffs, and occasionally in buildings, under bridges and highway overpasses and under tree bark.	Medium – Potential habitat for Eastern Small Footed Myotis was observed in the Study Area. Eastern Small-footed Myotis was not observed during the field program. No targeted bat surveys were completed as part of the field program.
Mammals	Northern Myotis	<i>Myotis septentrionalis</i>	END	END	END	S3?	MNRF	The Northern Myotis is a resident bat of upland forests of eastern North America, typically foraging for aerial insects in the forest understory. Maternity roosts are typically located under the bark of large trees and are rarely found in human-made structures. Hibernating colonies typically reside in cave crevices (COSEWIC, 2023). The precipitous population decline of this species in recent years is attributed to a condition referred to as WNS.	Medium - There is a potential habitat for Northern Myotis in the Study Area. Northern Myotis was not observed during the field program. No targeted bat surveys were completed as part of the field program.
Mammals	Tri-colored Bat	<i>Perimyotis subflavus</i>	END	END	END	S3?	MNRF	The Tri-coloured Bat roosts in colonies in tree cavities (COSEWIC 2013b) in a wide variety of deciduous and coniferous forest stands. It is strongly associated with forest watercourses and streamside vegetation (COSEWIC 2023).	Medium - There is a potential habitat for Tri-Colored Bat in the Study Area. Northern Myotis was not observed during the field program. No targeted bat surveys were completed as part of the field program.



Appendix E.1: Species at Risk Habitat Screening Assessment

Group	Common Name ¹	Scientific Name ²	SARO ³	COSEWIC ⁴	SARA ⁵	S-Rank ⁶	Source(s)	Habitat Description	Probability of Occurrence in the Study Area (Low, Medium, or High)
Fish	Silver Shiner	<i>Notropis photogenis</i>	THR	THR	THR	S2S3	NHIC	The Silver Shiner is a relatively large minnow, reaching a length of about 14 cm. Silver Shiners live in schools, feeding on crustaceans and adult flies. Preferred habitat for the Silver Shiner is moderately fast-flowing sections of larger streams. This species is restricted to the tributaries of Lakes St. Clair (Thames River), Erie (Grand River) and Ontario (Bronte Creek) in Southwestern Ontario. It has been recently reported in Sixteen Mile Creek, another tributary of Lake Ontario (COSSARO 2023).	Absent – Suitable habitat for Silver Shiner (watercourse) was not observed in the Study Area.
Fish	Black Redhorse	<i>Moxostoma duquesnei</i>	THR	THR	THR	S2	NHIC	The Black Redhorse is ranked S2 (imperiled) and is currently listed as Threatened both federally and provincially. It is afforded species protection under the Endangered Species Act (2007). Black Redhorse generally inhabits moderately sized, cool, clear streams, preferring pool areas in the summer and overwintering in deep pools (COSEWIC 2023).	Absent – Suitable habitat for Black Redhorse (watercourse) was not observed in the Study Area.
Mussel	Wavy-rayed Lampmussel	<i>Lampsilis fasciola</i>	THR	SC	SC	S2	NHIC	The Wavy-rayed Lampmussel is most abundant in small to medium-sized streams and rivers with steady flows in gravel or sand substrates. In and around riffle areas are preferred and are invariably found at sites that support a great diversity of other mussel species. Habitats in Great Lakes waters heavily infested with Zebra Mussels can no longer support the Wavy-rayed Lampmussel (COSEWIC 2023).	Absent – Suitable habitat for Wavy-rayed Lampmussel (watercourse) was not observed in the Study Area.

Notes:

¹**Scientific Name:** The scientific name of a species as published by the Natural Heritage Information Centre hosted by the Ministry of Northern Development, Mines, Natural Resources and Forestry / Land Information Ontario.

²**Common Name:** The common English name of a species as published by the Natural Heritage Information Centre hosted by the Ministry of Northern Development, Mines, Natural Resources and Forestry / Land Information Ontario.

³**S Rank:** Subnational Rank is the conservation status of a species or plant community within a particular province, territory, or state. In this scenario, it is the provincial level ranking system as published by the Natural Heritage Information Centre hosted by the Ministry of Northern Development, Mines, Natural Resources and Forestry / Land Information Ontario.

⁴**SARO Status:** Species at Risk in Ontario (Provincial Status as defined by the Endangered Species Act, 2007 as amended).

⁵**COSEWIC Status:** Status as defined by the Committee on the Status of Endangered Wildlife in Canada

⁶**SARA Status:** Federal status as defined by the Species at Risk Act

References:

NHIC: Natural Heritage Information Centre database review (Ministry of Northern Development, Mines, Natural Resources and Forestry / Land Information Ontario).

MNDMNRF: MNDMNRF Species at Risk in Ontario List. Species range information retrieved November 2021 from <https://www.ontario.ca/page/species-risk-ontario>

OBBA: Cadman, M. D., D.A. Sutherland, G.G. Beck, D. Lepage, A.R. Couturier. 2007. Atlas of the Breeding Birds of Ontario, 2001-2005. (eds) Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of natural resources, and Ontario Nature, Toronto, xxii + 318pp

ORAA: Ontario Nature. 2023. Ontario Reptile and Amphibian Atlas [web application]. Toronto, Ontario. Available online: <https://ontarionature.org/oraa/maps/>

Endangered Species Act and Species at Risk Act Acronyms

END: Endangered

THR: Threatened

SC: Special Concern

EXT: Extirpated

NAR: Not at Risk

Subnational Rankings (S RANK)

SNR: Unranked

SU: Unrankable – Currently unrankable due to lack of information

SNA: Not applicable – A conservation status rank is not applicable because the species is not a suitable target for conservation activities

S#S#: Range Rank – A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species

?: Indicates uncertainty in the assigned rank

S1: Critically Imperiled – Critically imperiled in the province (often 5 or fewer occurrences)

S2: Imperiled – Imperiled in the province, very few populations (often 20 or fewer),

S3: Vulnerable – Vulnerable in the province, relatively few populations (often 80 or fewer)

S4: Apparently Secure – Uncommon but not rare

S5: Secure – Common, widespread, and abundant in the province

SX: Presumed extirpated

SH: Possibly Extirpated (Historical)

SE: if an element is known to occur as an exotic in Ontario, the status value assigned is SE. A ? qualifier added to that value indicates uncertainty about whether it is exotic or native. Numeric ranks of 1 through 5 added to the exotic status indicates the element’s abundance in Ontario, with 1 indicating the least abundant and 5 the most.



Appendix E.2: Species of Conservation Concern Habitat Screening Assessment

Group	Common Name ¹	Scientific Name ²	SARO ³	COSEWIC ⁴	SARA ⁵	S-Rank ⁶	Source(s)	Habitat Description	Probability of Occurrence in the Study Area (Low, Medium, or High)
Avifauna	Bald Eagle	<i>Haliaeetus leucocephalus</i>	SC	NAR	NAR	S4	NHIC	The Bald Eagle almost always nests near water, usually on large lakes. Large stick nests are placed in trees located within mature woodlots. They usually prefer 250 ha of mature forest for breeding. However, along Lake Erie, where the lake provides a valuable food source, the eagles will nest in smaller woodlots or even single trees. This species has experienced a relatively recent and substantial increase in population as well as an expansion in a range following a decline during the mid-20th century (Cadman et al. 2007).	Absent – Habitat criteria is specialized and has been confirmed as not present in the Study Area. Bald Eagle was not observed during the breeding bird survey (3 site visits).
Avifauna	Grasshopper Sparrow	<i>Ammodramus savannarum</i>	SC	SC	-	S4B	NHIC	The Grasshopper Sparrow is found in large (>5 ha) sparsely vegetated grasslands, hay fields, pastures, prairies, and alvars with well-drained, sandy soil (COSEWIC 2013). The nests are typically well hidden in grasses.	Low – Potential habitat for Grasshopper Sparrows was observed in the Study Area. Grasshopper Sparrow was not observed during the breeding bird survey (3 site visits).
Avifauna	Eastern Wood-Pewee	<i>Contopus virens</i>	SC	SC	SC	S4B	Stantec, NHIC, eBird, OBBA	The Eastern Wood-Pewee is a forest bird of deciduous and mixed woods. Nest-site selection favors open space near the nest, typically provided by clearings, roadways, water, and forest edges. Nests are cryptic as they are covered with lichens, typically appearing like a knot on top of a branch and little is known about nesting behavior (Cadman et al, 2007).	Confirmed – Suitable Eastern Wood-Pewee habitat occurs within the woodland feature west of the Subject Lands. This species was observed during the spring 2023 field program (breeding bird survey).
Avifauna	Wood Thrush	<i>Hylocichla mustelina</i>	SC	THR	THR	S4B	NHIC	Wood Thrush prefers deciduous and mixed forests in southern Ontario, ranging from small and isolated to large and contiguous woodlots. The presence of tall trees and a thick understory are preferred (Cadman et al., 2007).	Low – Potential habitat for Wood Thrush was observed in the Study Area. This species was not observed during the breeding bird survey (3 site visits).
Avifauna	Barn Swallow	<i>Hirundo rustica</i>	SC	SC	THR	S4B	iNaturalist NHIC	The Barn Swallow commonly nests on walls or ledges of barns, bridges, culverts, or other man-made structures (Cadman et al. 2007). Where suitable nesting structures occur, Barn Swallow often form small colonies, sometimes mixed with other swallow species. The Barn Swallow feeds on aerial insects while foraging over a variety of open habitats such as pastures, lawns, meadows, and fields (COSEWIC 2021). It will also frequently forage in woodland clearings, over wetland habitats or open water where insect prey are abundant (Cadman et al. 2007).	Absent on Subject Lands – Suitable habitat was not observed on the Subject Lands. Barn swallow was not observed during the breeding bird survey (3 site visits).
Avifauna	Evening Grosbeak	<i>Coccothraustes vespertinus</i>	SC	SC	THR	S4	iNaturalist	During the breeding season, the Evening Grosbeak is generally found in open, mature mixed-wood forests dominated by fir species, White Spruce and/or Trembling Aspen. Its abundance is strongly linked to the cycle of its primary prey, the Spruce Budworm. Outside the breeding season, the species depends mostly on seed crops from tree species in the boreal forest such as firs and spruces. It is also attracted to ornamental trees that have seeds or fruit and may visit bird feeders (National Audubon Society 2023).	Low – Suitable habitat was not observed in the Study Area. The Species was not observed during the breeding bird survey (3 site visits).
Avifauna	Belted Kingfisher	<i>Megaceryle alcyon</i>	-	-	-	S5B, S4N	Stantec ¹	Streams, lakes, bays, coasts; nests in banks. During winter and migration, may be found in almost any waterside habitat, including the edges of small streams and ponds, large rivers and lakes, marshes, estuaries, and rocky coastlines; seems to require only clear water for fishing. During the breeding season, more restricted to areas with suitable dirt banks for nesting holes (National Audubon Society 2023).	Absent on Subject Lands – Suitable habitat for Belted Kingfisher was not observed on or directly adjacent to the Subject Lands. Stantec's 2007 observations of suitable habitat was observed were in earthen banks appear to be restricted to the banks of the Grand River, southeast of the Study Area.
Avifauna	Great Blue Heron	<i>Ardea herodias</i>	-	-	-	S4	OBBA, eBird, Stantec ²	Marshes, swamps, shores, tideflats. Forages in any kind of calm fresh waters or slow-moving rivers, also in shallow coastal bays. Nests in trees or shrubs near water, sometimes on the ground in areas free of predators (National Audubon Society 2023).	Absent on Subject Lands – Suitable habitat for Great Blue Heron was not observed on the Subject Lands. High in Study Area – Suitable habitat for Great Blue Heron is present in ponds and wetlands (PSW) in or near the Study Area.



Appendix E.2: Species of Conservation Concern Habitat Screening Assessment

Group	Common Name ¹	Scientific Name ²	SARO ³	COSEWIC ⁴	SARA ⁵	S-Rank ⁶	Source(s)	Habitat Description	Probability of Occurrence in the Study Area (Low, Medium, or High)
Avifauna	Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	-	-	-	S4S5B	Stantec ¹	Wood edges, groves, thickets. Breeds mostly in deciduous thickets and shrubby places, often on the edges of woodland or around marshes. Also, in second growth of mixed deciduous-coniferous woods, or along their brushy edges. In migration, seeks any kind of dense cover, usually among young trees or tall shrubs (National Audubon Society 2023).	Low – Potential habitat for Black-billed Cuckoo was observed in the Study Area. This species was not observed during the 2023 breeding bird survey (3 site visits).
Avifauna	Pine Warbler	<i>Setophaga pinus</i>	-	-	-	S5B, S3N	Stantec ¹	Chiefly open pine woods, pine barrens. Usually breeds in open pine woods, especially southern longleaf pine forest, sandy barrens of pitch pine with scrub oak undergrowth, jack-pine barrens, and similar habitats. Also, sometimes in cedar or cypress. In winter, occurs in a wider variety of habitats including heavily wooded bottomlands, orchards, thickets, woodland edges (National Audubon Society 2023).	Low – Suitable habitat for Pine Warbler was not observed in the Study Area. This species was not observed during the 2023 breeding bird survey (3 site visits).
Avifauna	Ovenbird	<i>Seiurus aurocapilla</i>	-	-	-	S5B	Stantec ¹	Near ground in leafy woods; in migration, thickets. Needs large tracts of mature deciduous or mixed forest for successful breeding. Will nest in a wide variety of forest types, as long as they have a closed canopy cover, large trees, and little ground cover. In winter (mostly in tropics), lives in forests and thickets, from dry lowlands to wet forests in the foothills (National Audubon Society 2023).	Absent – Suitable habitat for Ovenbird was not observed in the Study Area. This species was not observed during the 2023 breeding bird survey (3 site visits). Ovenbird requires 20 ha of habitat for breeding. The woodland west of the Subject Lands is too small to support area-sensitive species.
Avifauna	Pileated Woodpecker	<i>Dryocopus pileatus</i>	-	-	-	S5	Stantec ¹	Conifer, mixed, and hardwood forests; woodlots. Favors mature deciduous or mixed deciduous-coniferous forest, also coniferous forest. Wide variety of specific forest types from southern swamps to old growth Douglas-fir Forest of northwest. Also, in second growth and fragmented woodlots, as long as some large trees are present (National Audubon Society 2023).	High - good quality habitat was identified (large snags with roosting and feeding cavities noted) in the woodland feature west of the Subject Lands. There are known species record in the Study Area.
Avifauna	Hairy Woodpecker	<i>Dryobates villosus</i>	-	-	-	S5	Stantec ¹	Forests, woodlands, river groves, shade trees. Accepts wide variety of habitats so long as large trees present; found in deciduous, coniferous, and mixed forest, groves along rivers in prairie country, open juniper woodland, swamps (National Audubon Society 2023).	High - good quality habitat was identified in the woodland feature west of the Subject Lands. There are known species record in the Study Area.
Avifauna	Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	-	-	-	S5	OBBA, eBird, Stantec ^{1,2} , iNaturalist	Woodlands, groves, orchards, towns. Most common in deciduous forest, especially along rivers and in swamps. Also, in mixed coniferous and deciduous forest, less often in pure stands of pine. May be found in rather open areas, such as forest edges and clearings, groves of trees in farm country, shade trees in suburbs (National Audubon Society 2023).	Confirmed - this species was observed in suitable habitat (in the woodlands west of the Subject Lands) during the 2023 field program.
Avifauna	Winter Wren	<i>Troglodytes hiemalis</i>	-	-	-	S5B, S4N	Stantec ¹	Woodland underbrush; conifer forests (summer). Breeds mostly in moist coniferous forest with an understory of dense thickets, often close to water. Winters in very dense low growth in woods, especially along streambanks or among tangles, brushpiles, and fallen logs (National Audubon Society 2023).	Absent – Suitable habitat for Winter Wren was not observed in the Study Area. This species was not observed during the 2023 breeding bird survey (3 site visits). Winter Wren requires 30 ha of habitat for breeding. The woodland west of the Subject Lands is too small to support area-sensitive species.
Avifauna	Willow Flycatcher	<i>Empidonax traillii</i>	-	-	-	S4B	OBBA, eBird, Stantec ^{1,2}	Bushes, willow thickets, brushy fields, upland copses. Breeds in thickets of deciduous trees and shrubs, especially willows, or along woodland edges. Often near streams or marshes (especially in southern part of range) but may be found in drier habitats than Alder Flycatcher (National Audubon Society 2023).	Confirmed - this species was observed in suitable habitat (in the woodlands west of the Subject Lands) during the 2023 field program.
Avifauna	Warbling Vireo	<i>Vireo gilvus</i>	-	-	-	S5B	Stantec ¹	Deciduous and mixed woods, aspen groves, poplars, shade trees. Breeds in open deciduous or mixed woodland; also in orchards, shade trees of towns. Avoids unbroken mature forest (National Audubon Society 2023).	Low – The results of Stantec’s 2007 surveys determined this species was utilizing forest edge habitat and the wetland community habitat located east of Woolwich Street. This species was not observed during the 2023 breeding bird survey (3 site visits) for the current Study Area.



Appendix E.2: Species of Conservation Concern Habitat Screening Assessment

Group	Common Name ¹	Scientific Name ²	SARO ³	COSEWIC ⁴	SARA ⁵	S-Rank ⁶	Source(s)	Habitat Description	Probability of Occurrence in the Study Area (Low, Medium, or High)
Amphibians	Western Chorus Frog - Great Lakes - St. Lawrence - Canadian Shield population	<i>Pseudacris maculata pop. 1</i>	NAR	THR	THR	S4	ORAA	Western Chorus Frogs inhabit a range of habitat types, including woodlands, meadows, and agricultural land. They overwinter in terrestrial habitats under rocks, logs, leaf litter, loose soil, or animal burrows. The eggs are laid in small clumps attached to submerged vegetation, usually in small or shallow aquatic habitats, mostly temporary ponds and wetlands that become dry in the summer. The Western Chorus Frog will often move into grassy or weedy fields during the non-breeding summer season (COSEWIC, 2008).	Medium – Potential habitat for Western Chorus Frog was observed in the Study Area during the field program. Vernal pools and seasonal wetlands provide breeding habitat for amphibians. Western Chorus Frog was not observed during the 2007 field program. No targeted amphibian surveys were completed as part of the 2023 field program.
Reptiles	Milksnake	<i>Lampropeltis triangulum</i>	NAR	SC	SC	S4	ORRA	Generally, occur in rural areas, where it is most frequently reported in and around buildings, especially old structures. It is also found in a wide variety of habitats, from prairies, pastures, and hayfields to rocky hillsides and a wide variety of forest types. They must also be in proximity of water and suitable locations for basking and egg-laying.	Medium – There is a potential habitat for Milksnake in the Study Area. The species was not observed during the field program. No targeted snake surveys were completed as part of the 2008 or 2023 field program.
Reptiles	Midland Painted Turtle	<i>Chrysemys picta marginata</i>	NAR	SC	SC	S4	ORRA	Painted Turtles inhabit water bodies, such as ponds, marshes, lakes, and slow-moving creeks, that have a soft bottom and provide abundant basking sites and aquatic vegetation. These turtles often bask on shorelines or on logs and rocks that protrude from the water. The midland-painted turtle hibernates on the bottom of water bodies.	Low – Potential habitat for Midland Painted Turtle was not observed in the Study Area. The species was not observed during the field program. No targeted turtle surveys were completed as part of the field program.
Reptiles	Northern Map Turtle	<i>Graptemys geographica</i>	SC	SC	SC	S3	ORRA	Map Turtles are highly aquatic and inhabit slow-moving, large rivers and lakes with soft bottoms and abundant aquatic vegetation. Basking sites include rocks and deadheads adjacent to deep water. Nesting occurs in soft sand or soil and at a distance from the water, hibernation is communal and occurs at the bottoms of lakes. Females leave the water in June to nest (COSEWIC 2023).	Low – Potential habitat for Northern Map Turtle was not observed in the Study Area. The species was not observed during the field program. No targeted turtle surveys were completed as part of the field program.
Reptiles	Snapping Turtle	<i>Chelydra serpentina</i>	SC	SC	SC	S4	ORRA	Snapping Turtles inhabit ponds, sloughs, streams, rivers, and shallow bays that are characterized by slow-moving water, aquatic vegetation, and soft bottoms. Females show strong nest site fidelity and nest in sand or gravel banks at waterway edges in late May or early June (COSEWIC, 2023).	Low – Potential habitat for Snapping Turtles was not observed in the Study Area. The species was not observed in Study Area. No targeted turtle surveys were completed as part of the field program.
Insects	Monarch	<i>Danaus plexippus</i>	SC	END	SC	S4B, S2N	OBA, I Naturalist	In southern Ontario the Monarch is found primarily wherever milkweed and wildflowers (including goldenrods, asters, and purple loosestrife) exist. The Larvae occur only where milkweed exists; adults are more generalized, feeding on a variety of wildflower nectar. This includes abandoned farmland, along roadsides, and other open spaces where these plants grow (COSEWIC, 2023).	Medium (Study Area) – Potential habitat to support Monarchs was observed in the Study Area. No targeted insect surveys were completed as part of the field program. Low (Subject Lands) – Potential habitat to support Monarchs was not observed on the Subject Lands (limited milkweed observations). No targeted insect surveys were completed as part of the field program.
Insects	Betrothed Underwing Moth	<i>Catocala innubens</i>	-	-	-	S3	ETA	Throughout North America. Genus also occurs in Eurasia. Forests, especially deciduous forests. Larvae of most species feed on foliage of deciduous trees.	Medium – Potential habitat to support this species was observed in the Study Area. The species was not observed during the field program. No targeted insect surveys were completed as part of the field program.
Insects	Little Underwing Moth	<i>Catocala minuta</i>	-	-	-	S3	ETA	Throughout North America. Genus also occurs in Eurasia. Forests, especially deciduous forests. Larvae of most species feed on foliage of deciduous trees.	Medium – Potential habitat to support this species was observed in the Study Area. The species was not observed during the field program. No targeted insect surveys were completed as part of the field program.
Insects	Oldwife Underwing Moth	<i>Catocala palaeogama</i>	-	-	-	S3	ETA	Throughout North America. Genus also occurs in Eurasia. Forests, especially deciduous forests. Larvae of most species feed on foliage of deciduous trees.	Medium – Potential habitat to support this species was observed in the Study Area. The species was not observed during the field program. No targeted insect surveys were completed as part of the field program.
Insects	Penitent Underwing Moth	<i>Catocala piatrix</i>	-	-	-	S3	ETA	Throughout North America. Genus also occurs in Eurasia. Forests, especially deciduous forests. Larvae of most species feed on foliage of deciduous trees.	Medium – Potential habitat to support this species was observed in the Study Area. The species was not observed during the field program. No targeted insect surveys were completed as part of the field program.



Appendix E.2: Species of Conservation Concern Habitat Screening Assessment

Group	Common Name ¹	Scientific Name ²	SARO ³	COSEWIC ⁴	SARA ⁵	S-Rank ⁶	Source(s)	Habitat Description	Probability of Occurrence in the Study Area (Low, Medium, or High)
Insects	Tawny Emperor	<i>Asterocampa clyton</i>	-	-	-	S3	ETA	A woodland species that only occurs in southwestern Ontario and regularly at Point Pelee and Pelee Island never straying far from the larval foodplant, hackberry.	Medium – Potential habitat to support Tawny Emperor was observed in the Study Area. The species was not observed during the field program. No targeted insect surveys were completed as part of the field program.
Plant	Scarlet Beebalm	<i>Monarda didyma</i>	-	-	-	S3	NHIC	Scarlet Beebalm is found in moist woods with rich soils.	Medium – Potential habitat for Scarlet Beebalm was observed in the woodlands at the west end of the Study Area. The species was not observed during the field program, noting that floral inventory efforts focused on the eastern half of the woodlot. A portion of the woodlot is located outside of the Study Area (greater than 120m from the Subject Lands).
Fish	Greater Redhorse	<i>Moxostoma valenciennesi</i>	-	-	-	S3	NHIC	Greater Redhorse generally inhabits cool bottom waters of large streams with substantial flows.	Absent – Suitable habitat for Greater Redhorse (watercourse) was not observed in the Study Area.

Notes:

- ¹**Scientific Name:** The scientific name of a species as published by the Natural Heritage Information Centre hosted by the Ministry of Northern Development, Mines, Natural Resources and Forestry / Land Information Ontario.
- ²**Common Name:** The common English name of a species as published by the Natural Heritage Information Centre hosted by the Ministry of Northern Development, Mines, Natural Resources and Forestry / Land Information Ontario.
- ³**SARO Status:** Species at Risk in Ontario (Provincial Status as defined by the Endangered Species Act, 2007 as amended).
- ⁴**COSEWIC Status:** Status as defined by the Committee on the Status of Endangered Wildlife in Canada
- ⁵**SARA Status:** Federal status as defined by the Species at Risk Act
- ⁶**S RANK:** Subnational Rank is the conservation status of a species or plant community within a particular province, territory, or state. In this scenario, it is the provincial level ranking system as published by the Natural Heritage Information Centre hosted by the Ministry of Northern Development, Mines, Natural Resources and Forestry / Land Information Ontario.

References:

NHIC: Natural Heritage Information Centre database review (Ministry of Northern Development, Mines, Natural Resources and Forestry / Land Information Ontario).

MNRF: MNRF Species at Risk in Ontario List. Species range information retrieved November 2021 from <https://www.ontario.ca/page/species-risk-ontario>

OBBA: Cadman, M. D., D.A. Sutherland, G.G. Beck, D. Lepage, A.R. Couturier. 2007. Atlas of the Breeding Birds of Ontario, 2001-2005. (eds) Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of natural resources, and Ontario Nature, Toronto, xxii + 318pp

Ontario Butterfly Atlas: Retrieved October 2021 from <https://www.ontarioinsects.org/atlas/>

Endangered Species Act and Species at Risk Act Acronyms

- END:** Endangered
- THR:** Threatened
- SC:** Special Concern
- EXT:** Extirpated
- NAR:** Not at Risk

Subnational Rankings (S RANK)

- SNR:** Unranked
- SU:** Unrankable – Currently unrankable due to lack of information
- SNA:** Not applicable – A conservation status rank is not applicable because the species is not a suitable target for conservation activities
- S#S#:** Range Rank – A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species
- ?:** Indicates uncertainty in the assigned rank
- S1:** Critically Imperiled – Critically imperiled in the province (often 5 or fewer occurrences)
- S2:** Imperiled – Imperiled in the province, very few populations (often 20 or fewer),
- S3:** Vulnerable – Vulnerable in the province, relatively few populations (often 80 or fewer)
- S4:** Apparently Secure – Uncommon but not rare
- S5:** Secure – Common, widespread, and abundant in the province
- SX:** Presumed extirpated
- SH:** Possibly Extirpated (Historical)

SE: if an element is known to occur as an exotic in Ontario, the status value assigned is SE. A ? qualifier added to that value indicates uncertainty about whether it is exotic or native. Numeric ranks of 1 through 5 added to the exotic status indicates the element's abundance in Ontario, with 1 indicating the least abundant and 5 the most.



Appendix F Significant Wildlife Habitat Screening Assessment



Appendix F: Significant Wildlife Habitat Screening Assessment

Candidate Wildlife Habitat	Criteria	Methods	Probability of Occurrence in the Study Area (Low, Medium, or High)
Seasonal Concentration Areas			
Waterfowl Stopover and Staging Area (Terrestrial)	Fields with sheet water during spring (mid-March to May), or annual spring meltwater flooding found in any of the following Community Types: Meadow (CUM1), Thicket (CUT1). Agricultural fields with waste grains are commonly used by waterfowl, and these are not considered SWH unless they have sheet water available.	ELC surveys were used to assess features within the Study Area that may support waterfowl stopover and staging areas (terrestrial).	Low – Potentially suitable SWH habitat was observed in the Study Area but there are no wildlife records or field observations for listed waterfowl species.
Waterfowl Stopover and Staging Area (Aquatic)	The following Community Types: Meadow Marsh (MAM), Shallow Marsh (MAS), Shallow Aquatic (SA), Deciduous Swamp (SWD). Ponds, marshes, lakes, bays, coastal inlets, and watercourses used during migration to support waterfowl. The combined area of the ELC ecosites and a 100 m radius area is the SWH. Sewage treatment ponds and stormwater ponds do not qualify as a SWH; however, a reservoir managed as a large wetland or pond/lake does qualify.	ELC surveys were used to assess features within the Study Area that may support waterfowl stopover and staging areas (aquatic).	Low – Potentially suitable SWH habitat was observed in the Study Area but there are no wildlife records or field observations for listed waterfowl species.
Shorebird Migratory Stopover Area	Shorelines of lakes, rivers, and wetlands, including beach areas, bars, and seasonally flooded, muddy, and un-vegetated shoreline habitats. Great Lakes coastal shorelines, including groynes and other forms of armour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October. Sewage treatment ponds and storm water ponds do not qualify as a significant wildlife habitat. The following community types: Meadow Marsh (MAM), shoreline (BB), or Sand Dune (SD).	ELC surveys and wildlife habitat assessments were used to assess features within the Study Area that may support migratory shorebirds.	Low – Potentially suitable SWH habitat was observed in the Study Area but there are no wildlife records or field observations for listed shorebird species.



Appendix F: Significant Wildlife Habitat Screening Assessment

Candidate Wildlife Habitat	Criteria	Methods	Probability of Occurrence in the Study Area (Low, Medium, or High)
Raptor Wintering Area	At least one of the following Forest Community Types: Deciduous Forest (FOD), Mixed Forest (FOM) or Coniferous Forest (FOC), in combination with one of the following Upland Community Types: Meadow (CUM1), Thicket (CUT1), Savannah (CUS1), Woodland (CUW1) (<60% cover) that are >20 ha and provide roosting, foraging and resting habitats for wintering raptors. Upland habitat (CUM1, CUT1, CUS1, CUW1), must represent at least 15 ha of the 20-ha minimum size.	ELC surveys and GIS analysis were used to assess features within the Study Area that may support wintering raptors.	Low - Suitable SWH habitat was not observed in the Study Area but there are known raptor records in the general area.
Bat Hibernacula	Hibernacula may be found in caves, mine shafts, underground foundations, and karsts. May be found in these Community Types: Crevice (CCR), Cave (CCA).	ELC surveys were used to assess features within the Study Area that may support bat hibernacula.	Absent on Subject Lands – Habitat not observed on the Subject Lands or directly adjacent to the Subject Lands.
Bat Maternity Colonies	Maternity colonies considered significant wildlife habitat are found in forested ecosites. Either of the following Community Types: Deciduous Forest (FOD), Mixed Forest (FOM), Deciduous Swamp (SWD), Mixed Swamp (SWM). Maternity colonies can be found in tree cavities, vegetation and often in buildings (buildings are not considered to be SWH). Female Bats prefer wildlife tree (snags) in early stages of decay, class 1-3, or class 1 or 2. Silver-haired Bats prefer older mixed or deciduous forest and form maternity colonies in tree cavities and small hollows. Older forest areas with at least 21 snags/ha are preferred.	ELC surveys were used to assess features within the Study Area that may support bat maternity colonies.	High – Good quality SWH habitat has been identified associated with the woodlands west of the Subject Lands. There are records of several bat species in the area.



Appendix F: Significant Wildlife Habitat Screening Assessment

Candidate Wildlife Habitat	Criteria	Methods	Probability of Occurrence in the Study Area (Low, Medium, or High)
Turtle Wintering Areas	Snapping and Midland Painted turtles utilize ELC community classes: Swamp (SW), Marsh (MA) and Open Water (OA). Shallow water (SA), Open Fen (FEO) and Open Bog (BOO). Northern Map turtle- open water areas such as deeper rivers or streams and lakes can also be used as over-wintering habitat. Water has to be deep enough not to freeze and have soft mud substrate. Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate dissolved oxygen.	ELC surveys and wildlife habitat assessments were used to assess features within the Study Area that may support areas of permanent standing water but not deep enough to freeze.	Absent on Subject Lands – Habitat not observed on the Subject Lands or directly adjacent to the Subject Lands.
Snake Hibernacula	Hibernation occurs in sites located below frost lines in burrows, rock crevices, broken and fissured rock and other natural features. Wetlands can also be important over-wintering habitat in conifer or shrub swamps and swales, poor fens, or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock ground cover. Any ecosite in southern Ontario other than very wet ones may provide habitat. The following Community Types may be directly related to snake hibernacula: Talus (TA), Rock Barren (RB), Crevice (CCR), Cave (CCA), and Alvar (RBOA1, RBSA1, RBTA1).	ELC surveys, wildlife surveys and wildlife habitat assessments were used to assess features within the Study Area that may support snake hibernacula.	Low – Suitable SWH habitat was not observed in the Study Area but there are known raptor records in the general area.
Colonial-Nesting Bird Breeding Habitat (Bank and Cliff)	Eroding banks, sandy hills, borrow pits, steep slopes, sand piles, cliff faces, bridge abutments, silos, or barns found in any of the following Community Types: Meadow (ME), Thicket (TH), Bluff (BL), Cliff (CL). Does not include man-made structures (bridges or buildings) or recently (2 years) disturbed soil areas, such as berms, embankments, soil, or aggregate stockpiles. Does not include a licensed/permitted Mineral Aggregate Operation.	ELC surveys and wildlife habitat assessments were used to assess features within the Study Area that may support colonial bird breeding habitat.	Absent on Subject Lands – Habitat not observed on the Subject Lands or directly adjacent to the Subject Lands.



Appendix F: Significant Wildlife Habitat Screening Assessment

Candidate Wildlife Habitat	Criteria	Methods	Probability of Occurrence in the Study Area (Low, Medium, or High)
Colonial-Nesting Bird Breeding Habitat (Tree/Shrubs)	Identification of stick nests in any of the following Community Types: Mixed Swamp (SWM), Deciduous Swamp (SWD), Treed Fen (FET). The edge of the colony and a minimum 300 m area of habitat or extent of the Forest Ecosite containing the colony or any island <15.0 ha with a colony is the SWH. Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used.	ELC surveys and wildlife habitat assessments were used to assess features within the Study Area that may support colonial bird breeding habitat (Trees/Shrubs).	Low – Stick nests / suitable SWH habitat was not observed through the field program. There are colonial nesting species records (great Blue Heron) in the general area.
Colonial-Nesting Bird Breeding Habitat (Ground)	Any rocky island or peninsula within a lake or large river. For Brewer's Blackbird close proximity to watercourses in open fields or pastures with scattered trees or shrubs found in any of the following Community Types: Meadow Marsh (MAM1-6), Shallow Marsh (MAS1-3), Meadow (CUM1), Thicket (CUT1), Savannah (CUS1).	ELC surveys, breeding bird surveys and wildlife habitat assessments were used to assess features within the Study Area that may support colonial bird breeding habitat (Ground).	Absent on Subject Lands – Habitat not observed on the Subject Lands or directly adjacent to the Subject Lands. There are no Brewer's Blackbird records for the area.
Migratory Butterfly Stopover Areas	Located within 5 km of Lake Ontario. A combination of ELC communities, one from each land class is required: Field (ME, TH) and Forest (FOC, FOM, FOD). Minimum of 10 ha in size with a combination of field and forest habitat present.	ELC surveys and GIS analysis were used to assess features within the Study Area that may support migratory butterfly stopover areas.	Absent – The Study Area is not located within 5km of Lake Ontario.
Landbird Migratory Stopover Areas	The following community types: Forest (FOD, FOM, FOC) or Swamp (SWC, SWM, SWD). Woodlots must be >10 ha in size and within 5 km of Lake Ontario – woodlands within 2 km of Lake Ontario are more significant.	ELC surveys and GIS analysis were used to assess features within the Study Area that may support landbird migratory stopover areas.	Absent – The Study Area is not located within 5km of Lake Ontario.



Appendix F: Significant Wildlife Habitat Screening Assessment

Candidate Wildlife Habitat	Criteria	Methods	Probability of Occurrence in the Study Area (Low, Medium, or High)
Deer Yarding Areas	Delineated by the MNDMNRF as areas where deer move to in response to the onset of winter snow and cold. The following forested ecosites within Community Series: FOC, FOM, SWC, SWM. Deer yard may also occur in mixed and coniferous plantations (CUP2 and CUP3), and deciduous forest (FOD) and thicket (CUT) communities.	No studies required as the MNDMNRF delineates this habitat.	Absent – Not identified in the Study Area by MNRF.
Deer Winter Congregation Areas	Woodlots typically >100 ha in size unless determined by the MNR as significant. (If large woodlots are rare in a planning area >50 ha). All forested ecosites within Community Series: FOC, FOM, FOD, SWC, SWM, SWD. Conifer plantations much smaller than 50 ha may also be used.	No studies required as the MNDMNRF delineates this habitat.	Absent – Not identified in the Study Area by MNRF.
Rare Vegetation Communities			
Cliffs and Talus Slopes	A Cliff is vertical to near vertical bedrock >3 m in height. A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris. Any ELC Ecosite within Community Series: TAO, TAS, TAT, CLO, CLS, CLT. Most cliff and talus slopes occur along the Niagara Escarpment.	ELC surveys were used to assess features within the Study Area that would be considered cliffs or talus slopes.	Absent on Subject Lands – Habitat not observed on the Subject Lands or directly adjacent to the Subject Lands.
Sand Barrens	Sand barrens typically are exposed sand, generally sparsely vegetated and cause by lack of moisture, periodic fires, and erosion. Vegetation can vary from patchy and barren to tree covered but less than 60%. Any of the following Community Types: SBO1 (Open Sand Barren Ecosite), SBS1 (Shrub Sand Barren Ecosite), SBT1 (Treed Sand Barren Ecosite).	ELC surveys were used to assess features within the Study Area that would be considered to be sand barrens.	Absent on Subject Lands – Habitat not observed on the Subject Lands or directly adjacent to the Subject Lands.



Appendix F: Significant Wildlife Habitat Screening Assessment

Candidate Wildlife Habitat	Criteria	Methods	Probability of Occurrence in the Study Area (Low, Medium, or High)
Alvars	An alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. Vegetation cover varies from sparse lichen-moss associations to grasslands and shrublands and comprising a number of characteristic or indicator plant. Undisturbed alvars can be phyto- and zoogeographically diverse, supporting many uncommon or are relict plant and animal species. Vegetation cover varies from patchy to barren with a less than 60% tree cover. Any of the following Community Types: ALO1 (Open Alvar Rock Barren Ecosite), ALS1 (Alvar Shrub Rock Barren Ecosite), ALT1 (Treed Alvar Rock Barren Ecosite), FOC1 (Dry-Fresh Pine Coniferous Forest), FOC2 (Dry-Fresh Cedar Coniferous Forest), CUM2 (Bedrock Cultural Meadow), CUS2 (Bedrock Cultural Savannah), CUT2-1 (Common Juniper Cultural Alvar Thicket), or CUW2 (Bedrock Cultural Woodland). An Alvar site >0.5 ha in size.	ELC surveys were used to assess features within the Study Area that would be considered to be alvar communities.	Absent on Subject Lands – Habitat not observed on the Subject Lands or directly adjacent to the Subject Lands.
Old-growth Forest	Old-growth forests tend to be relatively undisturbed, structurally complex, and contain a wide variety of trees and shrubs in various age classes. These habitats usually support a high diversity of wildlife species. Woodland areas 30 ha or greater in size or with at least 10 ha interior habitat assuming 100 m buffer at edge of forest.	ELC surveys were used to assess features within the Study Area that would be considered to be old-growth forest communities.	Absent – The forest located west of the Subject Lands is less than 10 ha.



Appendix F: Significant Wildlife Habitat Screening Assessment

Candidate Wildlife Habitat	Criteria	Methods	Probability of Occurrence in the Study Area (Low, Medium, or High)
Savannahs	A Savannah is a tallgrass prairie habitat that has tree cover between 25 – 60%. Any of the following Community Types: TPS1 (Dry-Fresh Tallgrass Mixed Savannah Ecosite), TPS2 (Fresh-Moist Tallgrass Deciduous Savannah Ecosite), TPW1 (Dry-Fresh Black Oak Tallgrass Deciduous Woodland Ecosite), TPW2 (Fresh-Moist Tallgrass Deciduous Woodland Ecosite), CUS2 (Bedrock Cultural Savannah Ecosite).	ELC surveys were used to assess features within the Study Area that would be considered to be savannah communities.	Absent on Subject Lands – Habitat not observed on the Subject Lands or directly adjacent to the Subject Lands.
Tallgrass Prairies	A Tallgrass Prairie has ground cover dominated by prairie grasses. An open Tallgrass Prairie habitat has <25% tree cover. Any of the following Community Types: TPO1 (Dry Tallgrass Prairie Ecosite), TPO2 (Fresh-Moist Tallgrass Prairie Ecosite).	ELC surveys were used to assess features within the Study Area that would be considered to be tall-grass communities.	Absent on Subject Lands – Habitat not observed on the Subject Lands or directly adjacent to the Subject Lands.
Other Rare Vegetation Communities	Provincially Rare S1, S2 and S3 vegetation communities are listed in Appendix M of the SWHTG.	ELC surveys were used to assess features within the Study Area that would be considered to be other rare vegetation communities.	Absent on Subject Lands – Habitat not observed on the Subject Lands or directly adjacent to the Subject Lands.
Specialized Habitat for Wildlife			
Waterfowl Nesting Area	All upland habitats located adjacent to these wetland ELC Ecosites are Candidate SWH: MAS1, MAS2, MAS3, SAS1, SAM1, SAF1, MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SWT1, SWT2, SWD1, SWD2, SWD3, SWD4. Note: includes adjacency to Provincially Significant Wetlands.	ELC surveys were used to assess features within the Study Area that may support nesting waterfowl. Habitats adjacent to wetlands without standing water were not considered candidate SWH.	Low – Potentially suitable SWH habitat was observed in the Study Area but there are no wildlife records or field observations for listed waterfowl species.



Appendix F: Significant Wildlife Habitat Screening Assessment

Candidate Wildlife Habitat	Criteria	Methods	Probability of Occurrence in the Study Area (Low, Medium, or High)
Bald Eagle and Osprey nesting, Foraging, and Perching Habitat	Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. Nests located on man-made objects are not to be included as SWH (e.g., telephone poles and constructed nesting platforms). ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds, and wetlands.	ELC surveys, breeding bird surveys, and wildlife habitat assessments were used to assess features within the Study Area that may support nesting, foraging and perching habitat for large raptors.	Medium – Potential SWH habitat is present in the Study Area west of the Subject Lands in the deciduous woodlands / swamp and there are Bald Eagle records in the general area.
Woodland Raptor Nesting Habitat	All natural or conifer plantation woodland/forest stands combined >30 ha and with >4 ha of interior habitat. Interior habitat determined with a 200 m buffer. Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees. Species such as Coopers hawk nest along forest edges sometimes on peninsulas or small offshore islands. May be found in all forested ELC Ecosites. May also be found in SWC, SWM, SWD and CUP3.	ELC surveys, wildlife habitat assessments and GIS analysis were used to assess features within the Study Area that may support nesting habitat for woodland raptors.	Absent – The forest located west of the Subject Lands is less than 10 ha.
Turtle Nesting Areas	Exposed mineral soil (sand or gravel) areas adjacent (<100 m) or within the following ELC Ecosites: MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SAS1, SAM1, SAF1, BOO1, FEO1. Best nesting habitat for turtles is close to water, away from roads and sites less prone to loss of eggs by predation from skunks, raccoons, or other animals. For an area to function as a turtle-nesting area, it must provide sand and gravel that turtles are able to dig in and are located in open, sunny areas. Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH. Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes, and rivers are most frequently used.	ELC surveys, wildlife habitat assessments and GIS analysis were used to assess features within the Study Area that may support turtle nesting areas.	Absent on Subject Lands – Habitat not observed on the Subject Lands or directly adjacent to the Subject Lands.



Appendix F: Significant Wildlife Habitat Screening Assessment

Candidate Wildlife Habitat	Criteria	Methods	Probability of Occurrence in the Study Area (Low, Medium, or High)
Seeps and Springs	Seeps/Springs are areas where ground water comes to the surface. Often, they are found within headwater areas within forested habitats. Any forested Ecosite within the headwater areas of a stream could have seeps/springs. Any forested area (with <25% meadow/field/pasture) within the headwaters of a stream or river system.	ELC surveys were used to assess features within the Study Area that may support seeps/springs.	Low – Habitat not observed during the field program including vegetation review and HDFA assessment. Review of the hydrogeological report does not indicate the presence of seeps and springs on or directly adjacent to the Subject Lands.
Amphibian Breeding Habitat (Woodland)	All Ecosites associated with these ELC Community Series; FOC, FOM, FOD, SWC, SWM, SWD. Presence of a wetland, lake, or pond within or adjacent (within 120 m) to a woodland (no minimum size). Some small wetlands may not be mapped and may be important breeding pools for amphibians. Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat.	ELC surveys and amphibian call surveys were used to assess features within the Study Area that may support woodland breeding amphibians.	Medium – Potential SWH habitat is present in the Study Area west of the Subject Lands in the deciduous woodlands / swamp.
Amphibian Breeding Habitat (Wetland)	ELC Community Classes SW, MA, FE, BO, OA, and SA. Wetland areas >120 m from woodland habitats. Wetlands and pools (including vernal pools) >500 m² (about 25 m diameter) supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNR mapping and could be important amphibian breeding habitats. Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for calling, foraging, escape, and concealment from predators. Bullfrogs require permanent water bodies with abundant emergent vegetation.	ELC surveys and amphibian call surveys were used to assess features within the Study Area that may support breeding amphibians.	Medium – Potential SWH habitat is present in the Study Area west of the Subject Lands in the deciduous woodlands / swamp.



Appendix F: Significant Wildlife Habitat Screening Assessment

Candidate Wildlife Habitat	Criteria	Methods	Probability of Occurrence in the Study Area (Low, Medium, or High)
Woodland Area-Sensitive Bird Breeding Habitat	Large mature forest stands or woodlots >30ha with interior forest habitat (i.e., at least 200m from edge). All Ecosites associated with these ELC Community Series; FOC, FOM, FOD, SWC, SWM, SWD.	ELC surveys and GIS analysis were used to determine habitat.	Low – The forest located west of the Subject Lands is less than 10 ha.
Species of Conservation Concern			
Marsh Bird Breeding Habitat	All wetland habitats with shallow water and emergent aquatic vegetation. May include any of the following Community Types: Meadow Marsh (MAM), Shallow Aquatic (SA), Open Bog (BOO), Open Fen (FEO), or for Green Heron: Swamp (SW), Marsh (MA) and Meadow (CUM) Community Types.	ELC surveys and breeding bird surveys were used to identify marshes with shallow water and emergent vegetation that may support marsh breeding birds.	Low – Potentially suitable SWH habitat was observed in the Study Area but there are no wildlife records or field observations for listed marsh bird species.
Open Country Bird Breeding Habitat	Grassland areas > 30 ha, not Class 1 or Class 2 agricultural lands, with no row-cropping or hay or livestock pasturing in the last 5 years, in the following Community Type: Meadow (CUM).	ELC surveys and GIS analysis were used to identify grassland communities within the Study Area that may support area-sensitive breeding birds.	Absent on Subject Lands – Habitat not observed on the Subject Lands or directly adjacent to the Subject Lands.
Shrub/Early Successional Bird Breeding Habitat	Old field areas succeeding to shrub and thicket habitats >10 ha, not Class 1 or Class 2 agricultural lands, with no row-cropping or intensive hay or livestock pasturing in the last 5 years, in the following Community Types: Thickets (CUT), Savannas or Woodlands (CUW).	ELC surveys and GIS analysis were used to identify large communities that may support shrub/early successional breeding birds.	Absent on Subject Lands – Habitat not observed on the Subject Lands or directly adjacent to the Subject Lands.
Terrestrial Crayfish	Meadow marshes and edges of shallow marshes (no minimum size). Vegetation communities include MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, MAS1, MAS2, MAS3, SWD, SWT, SWM. Terrestrial Crayfish construct burrows in marshes, mudflats, meadows. Can be found far from water.	ELC surveys and wildlife habitat assessments were used to identify shallow marsh and meadow marsh communities that may support Terrestrial Crayfish within the Study Area.	Confirmed – Several Terrestrial Crayfish burrows (chimneys) were observed in the Study Area west of the Subject Lands.



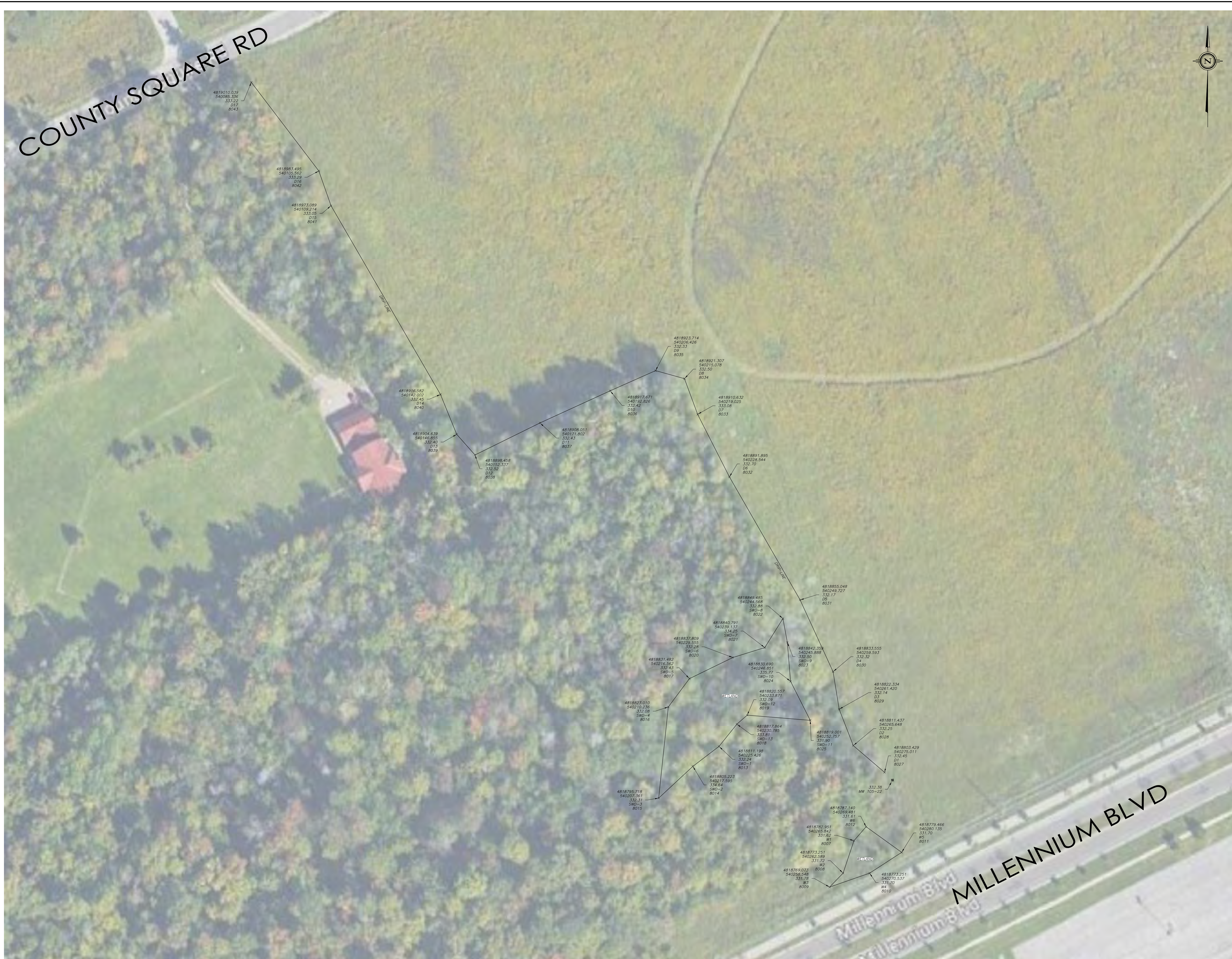
Appendix F: Significant Wildlife Habitat Screening Assessment

Candidate Wildlife Habitat	Criteria	Methods	Probability of Occurrence in the Study Area (Low, Medium, or High)
Special Concern and Rare Wildlife Species	All special concern and provincially rare (S1-S3, SH) plant and animal species (SOCC) within potential to occur in the Study Area.	ELC surveys, flora and wildlife surveys were used to identify suitable habitat for each potential SOCC listed in Appendix D.2 .	Confirmed - The results of field surveys and SOCC Screening Assessment confirmed Eastern Wood-pewee habitat in the woodlands west of the Subject Lands.
Animal Movement Corridors			
Amphibian Movement Corridor	Movement corridors are elongated, naturally vegetated parts of the landscape used by amphibians to move between breeding habitat and summer habitat. Determined based on identifying significant amphibian breeding habitat (wetland).	Identified after Amphibian Breeding Habitat is confirmed. Movement corridors should be considered when amphibian breeding habitat is confirmed as SWH from Amphibian Breeding Habitat.	Absent on Subject Lands – Habitat not observed on the Subject Lands.
Deer movement corridors	Associated with deer wintering habitat confirmed by MNRF.	Identified after deer wintering habitat is confirmed by the MNRF.	Absent – Deer wintering habitat hasn't been confirmed by the MNRF in the Study Area.



Appendix G Supporting Documents





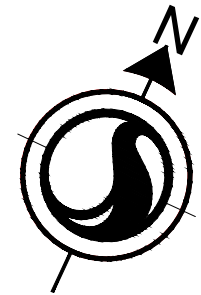
VERTICAL DATUM
ELEVATIONS ARE GEODETIC, REFERRED TO CGVD-1928:1978 AND DERIVED FROM GNSS OBSERVATIONS USING A REAL-TIME CORRECTION SERVICE.

July 5, 2023
DATE


MERRILL D. MCLEAN
ONTARIO LAND SURVEYOR


Stantec
Stantec Geomatics Ltd.
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 300-675 COCHRANE DRIVE, WEST TOWER
 MARKHAM, ONTARIO, L3R 0B8
 TEL. 905.944.7777
stantec.com

DWN: JF	CHK: MM	DATE: 4-JUL-23	PROJECT: 140310768
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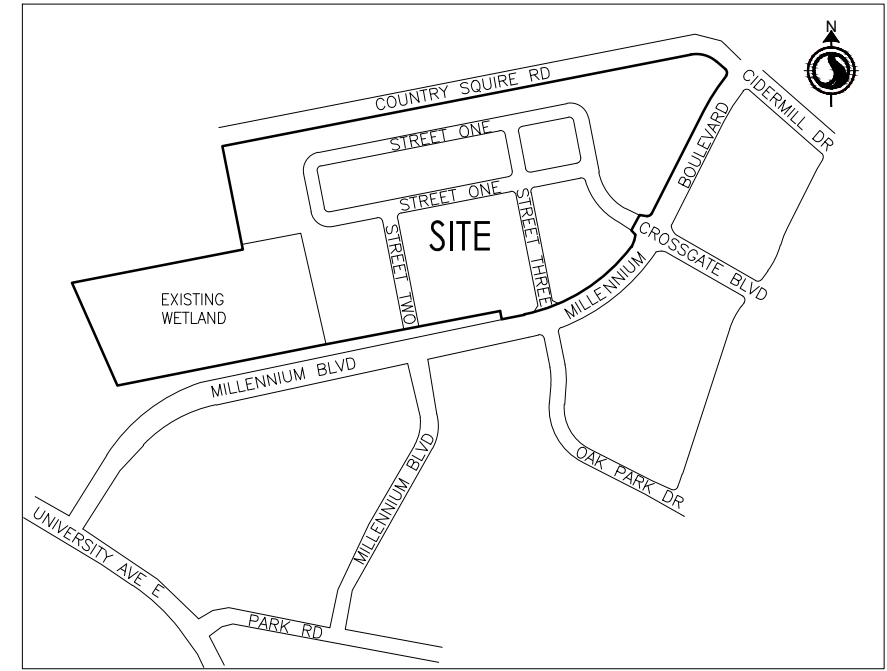


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Key Map NTS.



- Legend
- 

PROPOSED STORM MANHOLE
- 

PROPOSED STORM CATCHBASIN MANHOLE
- 

PROPOSED DOUBLE CATCHBASIN
- 

PROPOSED AREA DRAIN
- 

PROPOSED SANITARY MANHOLE
- 

PROPOSED VALVE & BOX
- 

PROPOSED HYDRANT
- 

PROPOSED STORM SEWER
- 

PROPOSED SANITARY SEWER
- 

PROPOSED WATERMAIN
- 

PROPOSED CLEAN WATER MANHOLE
- 

PROPOSED CLEAN WATER CATCHBASIN MANHOLE
- 

PROPOSED CLEAN WATER COLLECTOR CLEAN-OUT
- 

PROPOSED CLEAN WATER COLLECTION SYSTEM
- 

PROPOSED SLOPE
- 

PROPOSED RETAINING WALL
- 

PROPOSED SWALE
- 

STAGE LIMIT
- 

PROPERTY LINE
- 

DRIPLINE
- 

10m SURVEYED DRIPLINE SETBACK

2. CITY COMMENTS				WAM	SZ	2025.04.08
1. REVISED DP SUBMISSION PER CITY COMMENTS				WAM	SZ	2024.10.30
0. DRAFT PLAN SUBMISSION						2023.11.24
Revision/Issue				By	Appd	YYYY.MM.DD
File Name: 160310788_C-100UG				RAS	RAS	TAHF
				Dwn.	Dsgn.	Chkd.
						YYYY.MM.DD

Permit-Seal

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Client/Project
ACTIVA HOLDINGS INC.

MILLENNIUM BOULEVARD

WATERLOO, ON

Title
GENERAL SERVICING PLAN

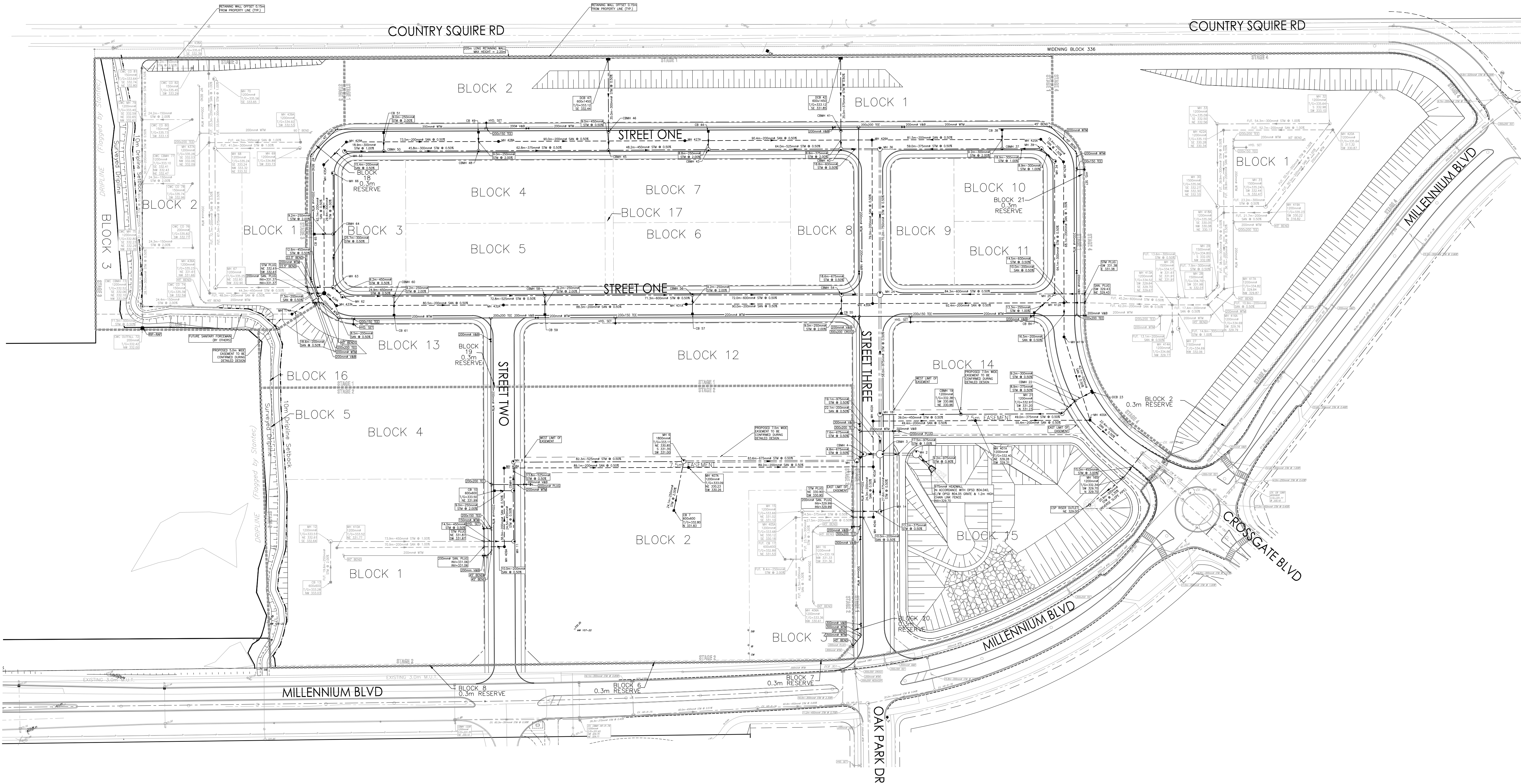
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Revision
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Sheet
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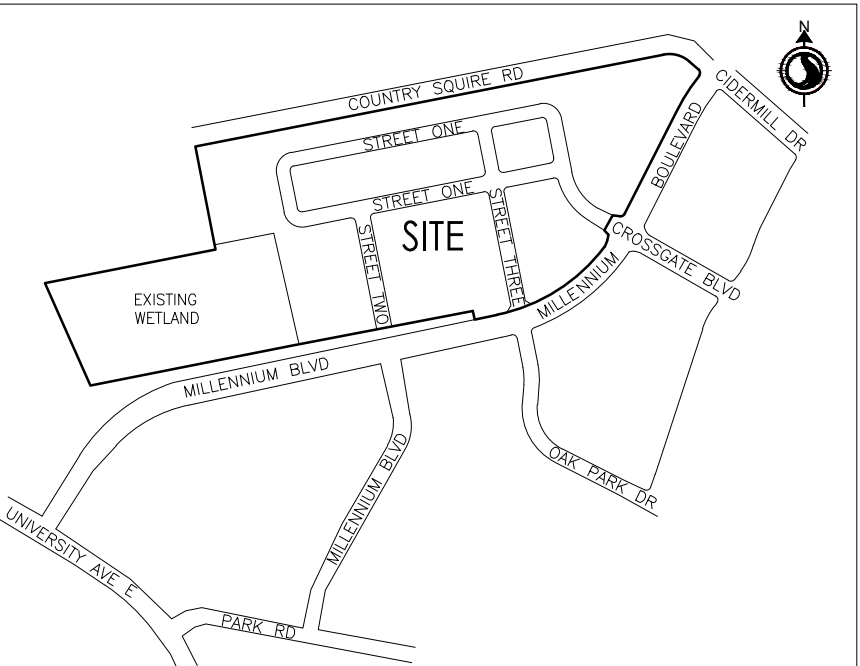
Drawing No.
C-100



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Key Map NTS.



- Legend
- EXISTING ELEVATION
 - PROPOSED ELEVATION
 - FLOW DIRECTION
 - PROPOSED DRAINAGE SWALE
 - EXISTING CONTOUR
 - RETAINING WALL
 - PROPOSED GRADING LIMIT
 - PROPERTY LINE
 - DRIPLINE
 - 10m SURVEYED DRIPLINE SETBACK
 - PROPOSED SLOPE
 - OVERLAND FLOW DIRECTION
 - PROPOSED STORM MANHOLE
 - PROPOSED STORM CATCHBASIN MANHOLE
 - PROPOSED DOUBLE CATCHBASIN
 - PROPOSED AREA DRAIN
 - PROPOSED SANITARY MANHOLE
 - PROPOSED VALVE & BOX
 - PROPOSED HYDRANT
 - PROPOSED CLEAN WATER MANHOLE
 - PROPOSED CLEAN WATER CATCHBASIN MANHOLE
 - PROPOSED CLEAN WATER COLLECTOR CLEAN-OUT

2. CITY COMMENTS	WAM	SZ	2025.04.08
1. REVISED DP SUBMISSION PER CITY COMMENTS	WAM	SZ	2024.10.30
0. DRAFT PLAN SUBMISSION			2023.11.24
Revision/Issue	By	Appd	YYYY.MM.DD

File Name: 160310788_C-400GP	RAS	RAS	TAHF	2025.04.07
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Permit-Seal

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Client/Project
ACTIVA HOLDINGS INC.

MILLENNIUM BOULEVARD

WATERLOO, ON

Title
GENERAL GRADING PLAN

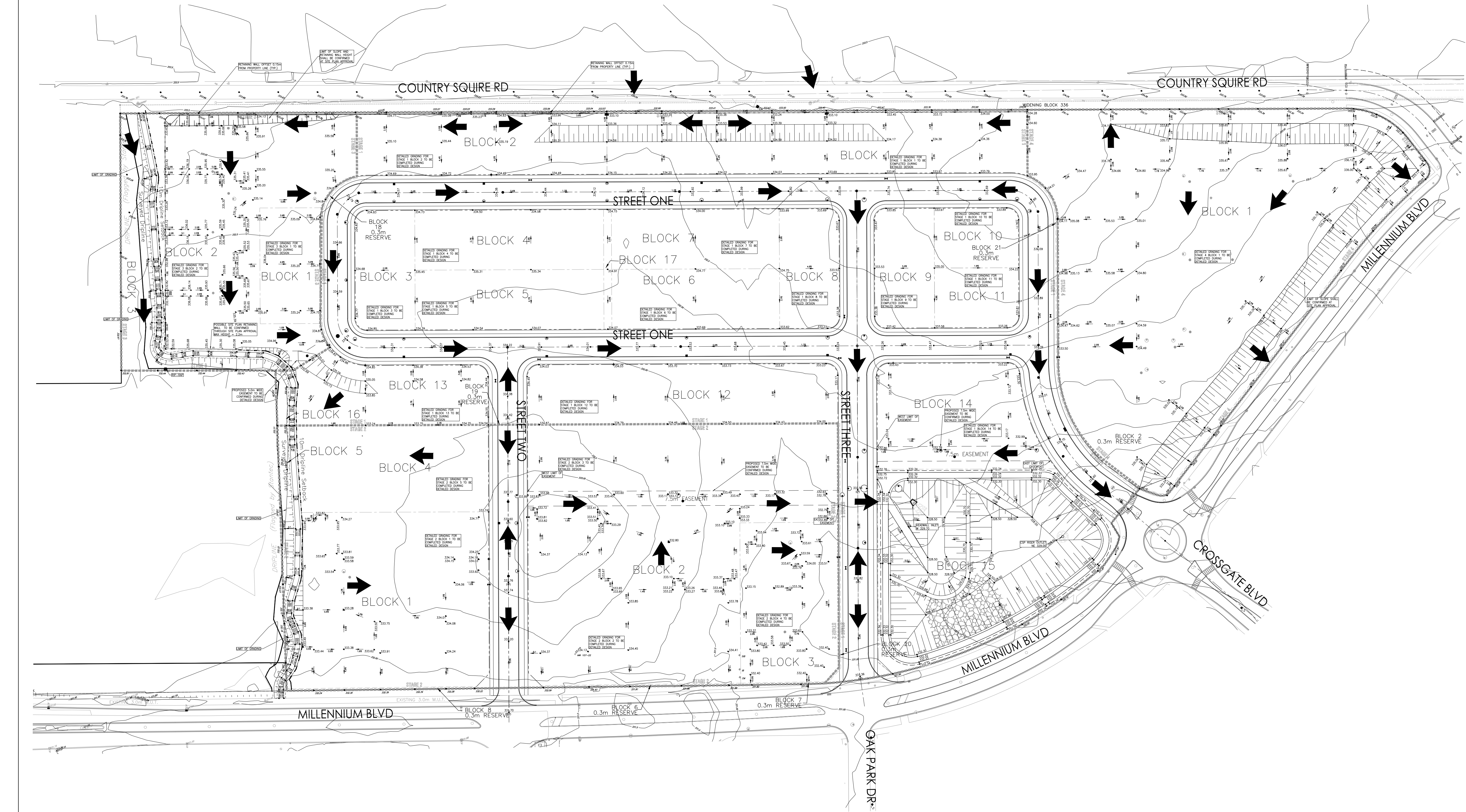
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Sheet
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Drawing No.
C-400



To:	Peter Armbruster Activa Holdings, Inc.	From:	Allison Healey, Grant Whitehead Stantec Consulting Ltd.
Project/File:	160310788.700.100	Date:	May 12, 2025

Reference: Hydrogeological Technical Memorandum, Supplementary Groundwater Monitoring and Wetland Assessment, Carriage Crossing Subdivision (400 Millenium Boulevard), Blocks 320 and 326 (Registered Plan 58M-506), Waterloo, Ontario

1 Introduction

Activa Holdings Inc (Activa) retained Stantec Consulting Ltd (Stantec) to conduct supplementary groundwater monitoring and a wetland assessment for the Carriage Crossing Subdivision, Blocks 320 and 326 (the Site). The Site is located at 400 Millenium Boulevard, located on the north edge of Waterloo, Ontario. The Site is bound by Country Squire Road to the north, Millenium Boulevard to the south and east, and residential and green space to the west. These lands have an area of approximately 15 hectares and is presently vacant. Figure 1 (Attachment 1) shows the location of the Site.

The proposed subdivision development will consist of a combination of single-family houses, townhomes, low-rise residential buildings, commercial spaces, a park, a stormwater management pond, and associated roads and parking. The proposed development is presented on Figure 1.

The objectives of the supplementary groundwater monitoring program are to characterize the geological and hydrogeological conditions at the Site, including identifying hydrostratigraphic/aquifer units, seasonal fluctuations in groundwater levels, and groundwater flow regimes.

The objectives of the wetland assessment are to assess the potential groundwater and surface water connection between the Site and the abutting wetland to the southwest of the Site by installing multi-level drive-point piezometers along a transect of the wetland and monitoring groundwater levels.

This Technical Memorandum is arranged into five sections, including this introduction (Section 1). Section 2 presents the physical setting of the Site at a regional scale. Section 3 presents the methodology for the supplementary groundwater monitoring program and wetland assessment. Section 4 presents local geological and hydrogeological conditions, with conclusions presented in Section 5.

All figures and tables referenced in this memorandum are presented in Attachments 1 and 2, respectively. The borehole logs are presented in Attachment 3.

Reference: Hydrogeological Technical Memorandum, Supplementary Groundwater Monitoring and Wetland Assessment, Carriage Crossing Subdivision (400 Millennium Boulevard), Blocks 320 and 326 (Registered Plan 58M-506), Waterloo, Ontario

2 Physical Setting

2.1 Physiography and Surface Water Features

The Site is located within the physiographic region defined by Chapman and Putnam (2007¹) as the Oxford Till Plain (Figure 2). The Oxford Till Plain in this area is characterized by drumlinized till plains consisting of sands and silts. Spillways associated with the Grand River are located to the west, north, and east of the Site (Figure 2).

The Site is located in the Grand River Watershed and a tributary to the Grand River begins on the eastern edge of the Site boundary and flows east towards the Grand River (Figure 2). Immediately adjacent to the western boundary of the Site is an unevaluated wetland classified as a Silver Maple Deciduous Swamp (Stantec, 2024²).

2.2 Regional Geology / Hydrogeology

Figure 3 presents the surficial geology in and surrounding the Site as mapped by the Ontario Geological Society (OGS) (2010³). The mapping indicates that the Site is covered by stone-poor, sandy to silty till (Unit 5b, Figure 3) and is surrounded by areas of glaciolacustrine-derived silty to clayey till (Unit 5d, Figure 3) as well as sandy and gravelly glaciofluvial deposits (Units 7a and 7b, Figure 3) and modern alluvial deposits (Unit 19, Figure 3).

Geological and hydrogeological conditions in the region have been mapped and described in the Region of Waterloo Tier Three Water Budget and Local Area Risk Assessment report prepared by Aqua Resource Inc (2012⁴). Subsurface conditions throughout the Region of Waterloo (Region) containing the Site consist of the following major geological formations and associated hydrostratigraphic classifications, with these units being listed from ground surface downward:

Surficial Outwash Deposits: Outwash sand and gravel is mapped at surface near the Grand River. Outwash sediment consists of fine- to coarse-grained sand and gravel and reaches a thickness of up to 15 m (units 7a and 7b, Figure 3).

Aquitard 1 - Port Stanley Till/Upper Maryhill Till: The Port Stanley till consists of silty to sandy till of glaciolacustrine origin. The Upper Maryhill Till is characterized as a stone-poor, clay rich till.

Aquifer 1 - Upper Waterloo Moraine Stratified sediment and equivalents, Middle Maryhill Till, Middle Waterloo Moraine Stratified Sediment and Equivalents: The composition of this unit can vary from silt and fine sand to coarse sand and gravel.

¹ Chapman, L.J. and D.F. Putnam. 2007. Physiography of southern Ontario. Ontario Geological Survey. Miscellaneous Release - Data 228.

² Stantec Consulting Limited. 2024. Environmental Impact Statement Update – 400 Millennium Boulevard, Waterloo, Ontario. November 2024.

³ Ontario Geological Survey (OGS). 2010. Surficial geology of southern Ontario; Ontario Geological Survey, Miscellaneous Release Data 128 – Revised.

⁴ AquaResource Inc. 2012. Region of Waterloo Tier Three Water Budget and Local Area Risk Assessment, Rural Well Fields Characterization Report. Prepared for the Regional Municipality of Waterloo, September 2012.

Reference: Hydrogeological Technical Memorandum, Supplementary Groundwater Monitoring and Wetland Assessment, Carriage Crossing Subdivision (400 Millenium Boulevard), Blocks 320 and 326 (Registered Plan 58M-506), Waterloo, Ontario

Aquitard 2 - Lower Maryhill Till: The Lower Maryhill Till is a clay to silty clay till unit and is a regional hydrostratigraphic unit.

Aquifer 2 - Catfish Creek Outwash: This unit consists of the lower moraine stratified sediments comprising fine to coarse sand and some gravel. When present, these deposits are found below Aquitard 2, mainly along the eastern flank of the Waterloo Moraine (i.e., Waterloo Hills as shown in Figure 2).

Aquitard 3 - Catfish Creek Drift: This unit is nearly continuous throughout the Region. Together with Aquitard 2, these units form a main hydrostratigraphic marker within the Waterloo Moraine. This unit comprises a stony, sandy silt to silty sand till with little clay content, commonly referred to as “hardpan” by water well drillers.

Aquifer 3 - Pre-Catfish Creek Outwash: The pre-Catfish Creek outwash is described as coarse-grained, pebble to cobble gravel with a medium to coarse-grained sand matrix.

Aquitard 4 - Canning Drift, Pre-Canning Till: This unit is characterized as silty to clayey till and is located intermittently throughout the Region.

Aquifer 4 - Pre-Canning Outwash: This unit consists of glaciofluvial and glaciolacustrine sands and gravels, typically found east of the Grand River.

3 Methodology

3.1 Supplementary Groundwater Monitoring

3.1.1 Borehole Advancement

From March 15 to 22, 2022, Aardvark Drilling Inc. (Aardvark) drilled eight boreholes at the Site under the observation of Stantec personnel, with each borehole being equipped with a single monitoring well (i.e., MW101-22 to MW108-22). Overall, Stantec strategically located the boreholes throughout the Site near the same location as wells/boreholes that were previously installed onsite (LVM, 2006⁵) but are no longer intact. Boreholes were spread across the Site to obtain a spatially representative understanding of soil and groundwater conditions and to evaluate local patterns of groundwater flow. Figure 1 provides the locations of the new boreholes as well as boreholes from the LVM (2006) investigation.

Aardvark drilled the boreholes using a CME 850 rig equipped with a hollow stem auger drilling system. Soil sampling occurred using a 0.6 m long stainless-steel split spoon sampler at 0.75 m intervals for the entire depth of each borehole. The completed depths of the boreholes ranged from 4.4 to 7.6 m below ground surface (BGS). Stantec logged the borehole stratigraphy using the American Society for Testing and Materials (ASTM) guideline for the description and identification of soils. The borehole logs contained descriptions (where relevant and possible) of soil type, texture, colour, structure, consistency, plasticity, moisture content, and other visual and olfactory observations. Attachment 3 provides copies of the borehole logs.

⁵ LVM Naylor. 2006. Hydrogeological and Geotechnical Investigation, Activa Waterloo East Lands, Woolwich Street and Country Squire Road, Waterloo, Ontario. Prepared for Activa Group, February 2006.

Reference: Hydrogeological Technical Memorandum, Supplementary Groundwater Monitoring and Wetland Assessment, Carriage Crossing Subdivision (400 Millenium Boulevard), Blocks 320 and 326 (Registered Plan 58M-506), Waterloo, Ontario

3.1.2 Monitoring Well Installations

Aardvark installed the monitoring wells adhering to the construction requirements as outlined under Ontario Regulation 903 (O.Reg. 903). Installation details for each of the monitoring wells are summarized in Table 1 and on the borehole logs provided in Attachment 3. Each monitoring well is constructed of 50 mm inner diameter, Schedule 40 polyvinyl chloride (PVC) pipe, having a No. 10 slot screen (0.01-inch slot) measuring 3.0 m in length. Backfilling of the screened interval consisted of No. 2 grade silica sand to heights ranging from 0.1 to 0.3 m above the top of screen, followed by bentonite holeplug to ground surface prevent a hydraulic connection from occurring between the screened formation and overlying soils. The completion of each monitoring well involved encasing the pipe stick-up in a lockable steel casing, with the base of this casing being held in place with bentonite holeplug and/or cement. Stantec Geomatics surveyed the ground surface and top-of-pipe elevations at each borehole location to a geodetic benchmark using a Trimble R10-2, having a spatial accuracy of +/- 0.03 m and +/- 0.02 m in the vertical and horizontal plane, respectively.

3.1.3 Groundwater Level Monitoring

Stantec recorded groundwater levels in the eight monitoring wells using a combination of automated and manual measurement techniques. The automated measurement of water levels occurred using a Solinst Edge Levellogger®, which is a single device consisting of a pressure transducer and data logger suspended in the water column of each monitoring well (Logger). The Loggers record total pressure (atmospheric + height of water column) and require correcting using atmospheric pressure data collected from a Solinst Barologger® (suspended in the air of one of the onsite monitoring wells). Figures 4 and 5 present the corrected Logger data recorded at the previously mentioned monitoring wells from March 2022 to July 2024.

Stantec personnel manually measured water levels in the previously mentioned monitoring wells from March 2022 to July 2024, with the results of this monitoring being presented in Table 2. Manual measurements were obtained using a battery operated Heron™ water level meter. Equipped with an electrode connected to a graduated polyethylene tape, Stantec personnel used the meters to measure the depth to water by slowly lowering the electrode into the well until the buzzer sounded. Stantec personnel recorded the water level measurements in metres to the nearest 0.01 m and converted to elevations above mean sea level (AMSL) using surveyed elevation data. The manual water level data were also used to calibrate and check the accuracy of the data recorded by the Levelloggers.

3.2 Wetland Assessment

3.2.1 Drive-Point Piezometer Installation

In April 2023, Stantec personnel installed three multi-level drive-point piezometers, each consisting of a shallow (S) and deep (D) pipe (i.e., DP101-23(S/D) to DP103-23(S/D)), into the wetland adjacent to the Site to assess the potential groundwater and surface water connection between the wetland and the Site. The drive-point piezometers consist of a 19 mm diameter, 0.45 m long steel screen, connected to 25 mm diameter steel risers of varying lengths. The piezometers were hand-driven into the substrate using a fence post driver. Figure 1 presents the locations of the drive-point piezometers, with a summary of the construction details provided in Table 1.

Reference: Hydrogeological Technical Memorandum, Supplementary Groundwater Monitoring and Wetland Assessment, Carriage Crossing Subdivision (400 Millenium Boulevard), Blocks 320 and 326 (Registered Plan 58M-506), Waterloo, Ontario

3.2.2 Groundwater and Surface Water Level Monitoring

Stantec recorded groundwater and surface water levels at the previously mentioned drive-point piezometers using a combination of automated and manual measurement techniques. The automated measurement of water levels occurred using a Solinst Edge Levellogger® or a VanEssen Diver® Logger, both of which are a single device consisting of a pressure transducer and data logger suspended in the water column of each monitoring well. The Loggers record total pressure (atmospheric + height of water column) and require correcting using atmospheric pressure data collected from the same Barologger® used for the monitoring wells.

Figure 6 presents the corrected Logger data recorded at the drive-point piezometers between April 2023 and July 2024. Stantec manually measured water levels in the drive-point piezometers seven times between April 2023 and July 2024, with the results of this monitoring presented in Table 3. Manual measurements were obtained using a similar water level meter as was used for the monitoring wells (Section 3.1.3).

4 Local Geology and Hydrostratigraphy

4.1 Geology and Hydrostratigraphy

Figure 3 presents the surficial geology of the Site as mapped by the OGS (2010), which indicates that the Site is covered by silty to sandy till deposits (unit 5b, Figure 3). In general, the results from the on-Site drilling support this interpretation. Soils at the Site consist of surficial topsoil extending to approximately 0.4 to 0.9 m BGS, which in turn overlies sandy silt and/or clayey silt till. The sandy silt/clayey silt till is interpreted to be part of the Port Stanley Till and/or Upper Maryhill Till. In the central and eastern portions of the Site (e.g. at all wells except MW101-22 and MW105-22), sand was also encountered in the boreholes and are interpreted to represent ice-contact stratified deposits. The till/sand extended to the maximum depth of investigation, which ranged between 4.4 to 7.6 m BGS. An interpretation of the stratigraphy of the Site along Cross-Section A-A' is presented on Figure 7.

Previous soil and groundwater investigations conducted in the Site and on adjacent lands by LVM Naylor (2006⁵) included the drilling of seven boreholes (i.e., BH1 to BH3 and BH7 to BH10; Figure 1). The subsurface soils beneath the topsoil (0.3 to 0.5 m thick) were reported to consist of silt, silt till, and/or clay till, with sand also being encountered in the central and eastern portions of the property. Findings of the LVM Naylor (2006) report are consistent with the drilling completed as a part of Stantec's investigation.

4.2 Hydrogeology

4.2.1 Groundwater Levels

4.2.1.1 Monitoring Wells

Data loggers equipped in on-Site monitoring wells have been recording groundwater elevations since March 2022. Figures 4 and 5 present hydrographs of groundwater elevation fluctuations recorded in the monitoring wells, which have ranged from 329.0 to 333.1 m AMSL. In May 2022, heaving occurred at MW108-22, resulting in the top of casing being raised by approximately 0.7 m and the hydrographs were adjusted to account for this change in elevation. In general, groundwater elevations in the monitoring wells exhibited seasonal variability, with higher groundwater elevations during the late winter to spring and lower

Reference: Hydrogeological Technical Memorandum, Supplementary Groundwater Monitoring and Wetland Assessment, Carriage Crossing Subdivision (400 Millennium Boulevard), Blocks 320 and 326 (Registered Plan 58M-506), Waterloo, Ontario

groundwater elevations during the late summer and fall. This seasonal variability in groundwater elevation fluctuations is typical of shallow groundwater systems in southern Ontario.

The interpreted high groundwater contours are presented on Figure 8, which are derived using the highest groundwater measurements recorded in the on-Site monitoring wells and drive-point piezometers between March 2022 and July 2024. Figure 8 indicates that groundwater levels are highest in the northwest portion of the Site and lowest in the southeast portion of the Site.

4.2.1.2 Drive-Point Piezometers

Figure 6 presents a summary of the groundwater elevations at the drive-point piezometers located in the wetland to the west of the Site. In the shallow drive-point piezometers, groundwater elevations range between 330.9 and 332.5 m AMSL, with these groundwater elevations being reflective of the water table surface. Groundwater elevations in the shallow piezometers are generally consistent with surface water elevations adjacent to the piezometer, suggesting that during periods when ponded water is observed in the wetland that the water table intersects the wetland substrate. Vertical hydraulic gradients at each of the multi-level drive-point piezometers fluctuated from predominantly downward (recharge condition) to periodically upward (discharge condition), with gradients ranging from 0.55 to -1.00 over the monitoring period (March 2022 and July 2024). Overall, average vertical hydraulic gradients recorded at DP101-23(S/D), DP102-23(S/D), and DP103-23(S/D) have ranged from -0.20 to -0.77, suggesting that the wetland predominantly functions as a groundwater recharge feature.

4.2.2 Groundwater Flow

Groundwater flow contours based on manual water level measurements obtained from monitoring wells and drive-point piezometers on May 25, 2023, are presented on Figure 9. Groundwater flow is generally from the northwest to the southeast, with flow moving away from the wetland and across the Site towards Millennium Boulevard. These results indicate that the future development of the Site will not have an impact on existing groundwater flows that may sustain the wetland, given that these potential groundwater inputs originate from the lands to the northwest of the Site.

5 Conclusions

The following conclusions are provided based on the completed supplementary groundwater monitoring program and wetland assessment:

1. Stratigraphic conditions beneath the Site consist predominantly of surficial topsoil overlying native deposits of sandy silt and/or clayey silt till. In the central and eastern portions of the Site, sand is encountered in the glacial till deposits.
2. Groundwater elevations at the on-Site monitoring wells range between 329.0 to 333.1 m AMSL depending on the location and season. Season variability was observed at all monitoring wells, with higher groundwater elevations occurring during the late winter to spring and the lowest groundwater elevations occurring during the late summer and fall. This seasonal variability in groundwater elevation fluctuations is typical of shallow groundwater systems in southern Ontario.

Reference: Hydrogeological Technical Memorandum, Supplementary Groundwater Monitoring and Wetland Assessment, Carriage Crossing Subdivision (400 Millennium Boulevard), Blocks 320 and 326 (Registered Plan 58M-506), Waterloo, Ontario

3. Groundwater elevations measured at the drive-point piezometers in the wetland immediately adjacent to the western boundary of the Site have ranged between 330.9 and 332.5 m AMSL. Although measured vertical hydraulic gradients are occasionally upward beneath the wetland, suggesting the presence of groundwater discharge conditions, overall, average vertical hydraulic gradients throughout the monitoring period (March 2022 and July 2024) have ranged from -0.20 to -0.77 (downward), suggesting that the wetland predominantly functions as a groundwater recharge feature.
4. Groundwater flow direction is from the northwest to the southeast away from the wetland towards Millennium Boulevard. The direction of groundwater flow indicates that development of the Site is not expected to have an impact on pre-existing groundwater flow that may sustain the wetland. These results indicate that the future development of the Site will not have an impact on existing groundwater flows that may sustain the wetland, given that these potential groundwater inputs originate from the lands to the northwest of the Site.

Stantec trusts that this memorandum sufficiently highlights the results of the supplementary groundwater monitoring and wetland assessment programs.

Sincerely,

Stantec Consulting Ltd.

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Attachments: Attachment 1 – Figures
Attachment 2 – Tables
Attachment 3 - Borehole Logs

May 12, 2025
Peter Armbruster

Reference: Hydrogeological Technical Memorandum, Supplementary Groundwater Monitoring and Wetland Assessment, Carriage Crossing Subdivision (400 Millenium Boulevard), Blocks 320 and 326 (Registered Plan 58M-506), Waterloo, Ontario

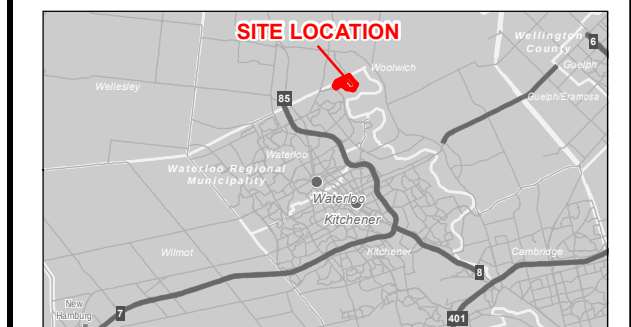
Attachment 1 Figures



- Monitoring Well (Stantec, 2022)
- Borehole (Naylor, 2006)
- Drive-point Piezometer (Stantec, 2022)
- Proposed Site Plan
- Cross-Section Location
- Topographic Contour (1m Interval)
- Topographic Contour 0.5m Interval)
- Wetland - Not evaluated per Ontario Wetland Evaluation System
- Wetland - Evaluated (GRCA)
- Site Boundary

0 50 100 metres
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- Notes**
1. Coordinate System: NAD 1983 UTM Zone 17N
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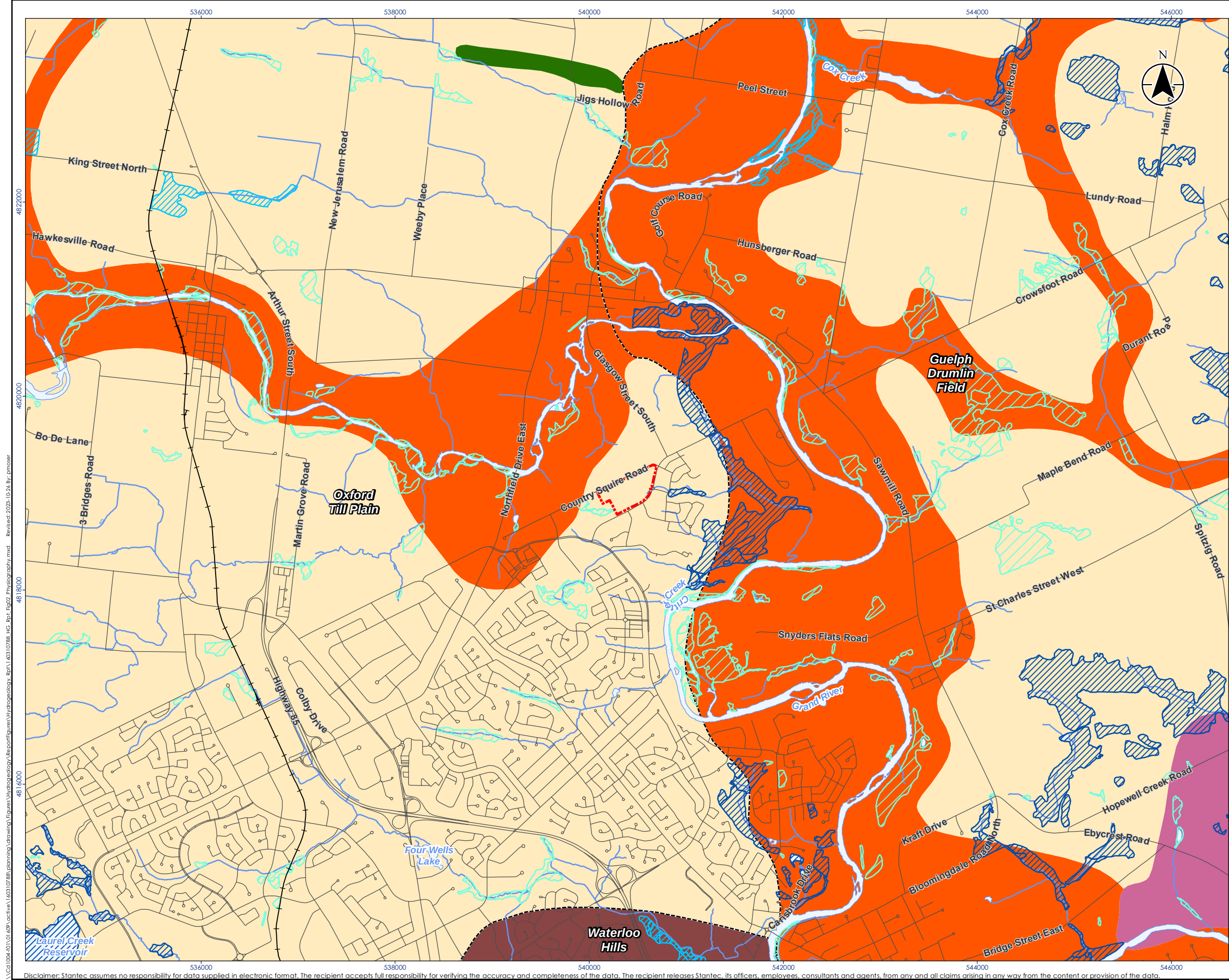
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Prepared by PRM on 2023-10-26
Technical Review by GW on 2023-10-26

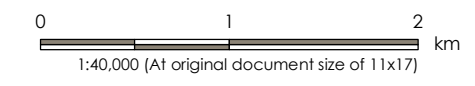
Client/Project
ACTIVA HOLDINGS INC.
SUPPLEMENTARY GROUNDWATER MONITORING
400 MILLENNIUM BOULEVARD, WATERLOO

Figure No.
1

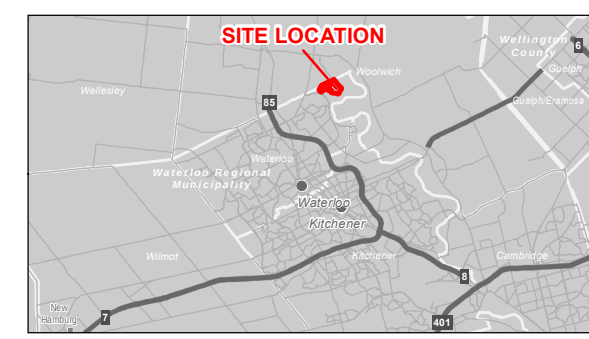
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Site Location



- Site Boundary
 - Road
 - Railway
 - Watercourse
 - Waterbody
 - Wetland - Evaluated (Provincial)
 - Wetland - Evaluated (Other)
 - Wetland - Not evaluated per Ontario Wetland Evaluation System
- Physiography**
- 13: Eskers
 - 6: Till Plains (Drumlinized)
 - 4: Kame Moraines
 - 3: Spillways
 - 2: Till Moraines
- Physiographic Region Boundary



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 17N
 2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017.
 3. Chapman, L.J. and Putnam, D.F. 2007. Physiography of southern Ontario; Ontario Geological Survey, Miscellaneous Release—Data 228.



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400 MILLENNIUM BOULEVARD, WATERLOO

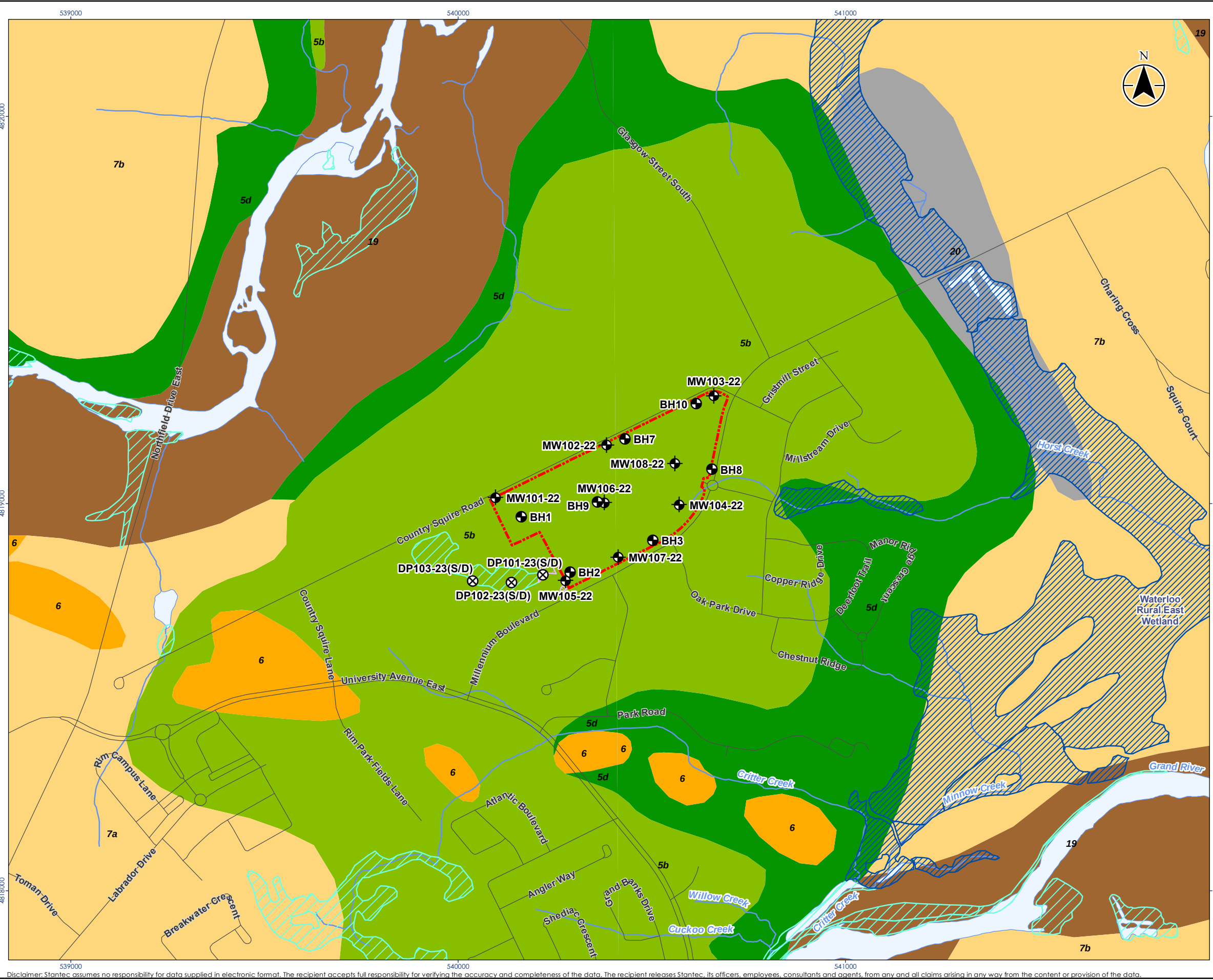
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Title
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Stantec

**Site Boundary**

**Monitoring Well (Stantec, 2022)**

**Borehole (Naylor, 2006)**

**Drive-point Piezometer (Stantec, 2022)**

**Road**

**Watercourse**

**Waterbody**

**Evaluated-Provincial**

**Wetland - Not evaluated per Ontario Wetland Evaluation System**

**Wetland - Evaluated (GRCA)**

Surficial Geology

**20: Organic deposits**

**19: Modern alluvial deposits**

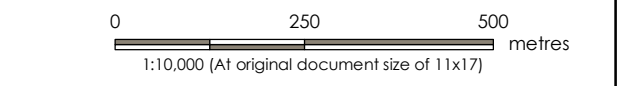
**7a: Glaciofluvial deposits (Sandy deposits)**

**7b: Glaciofluvial deposits (Gravelly deposits)**

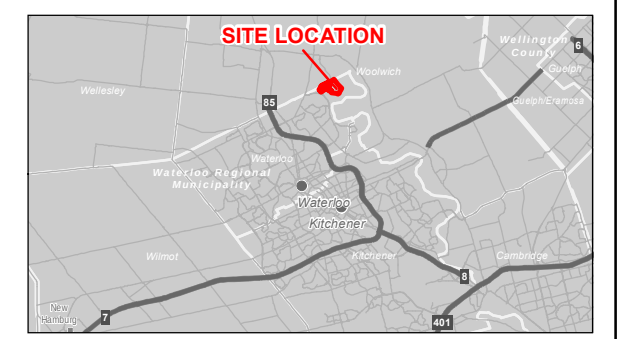
**6: Ice-contact stratified deposits**

**5b: Stone-poor, carbonate-derived silty to sandy till**

**5d: Glaciolacustrine-derived silty to clayey till**



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 17N
 2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017.
 3. Ontario Geological Survey 2010, Surficial geology of Southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 128-REV ISBN 978-1-4435-2483-4.



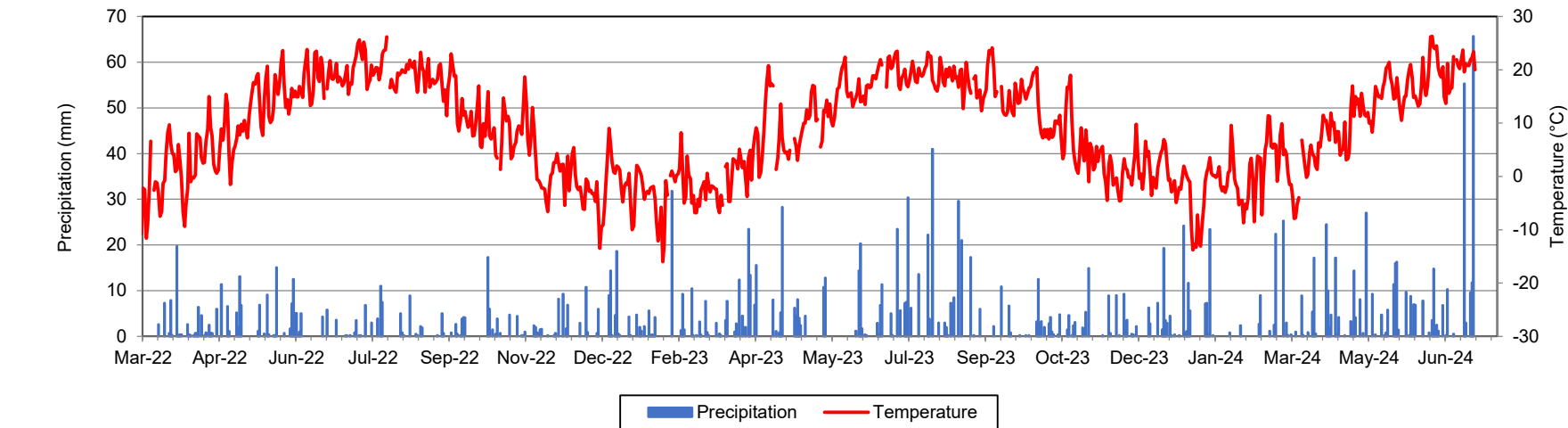
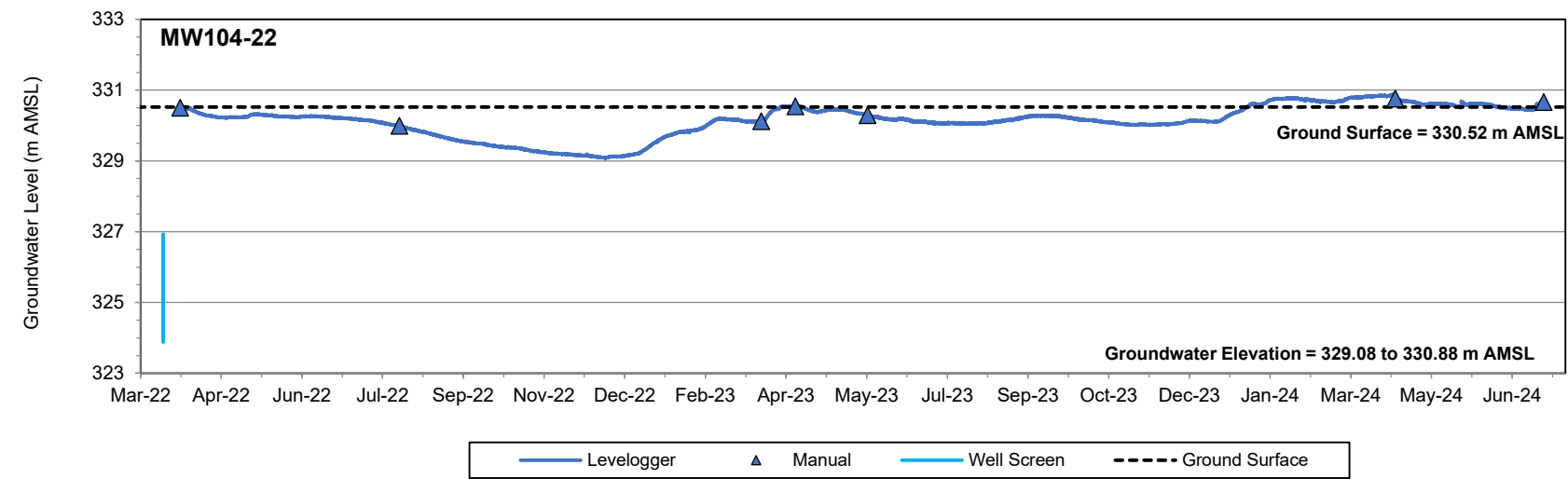
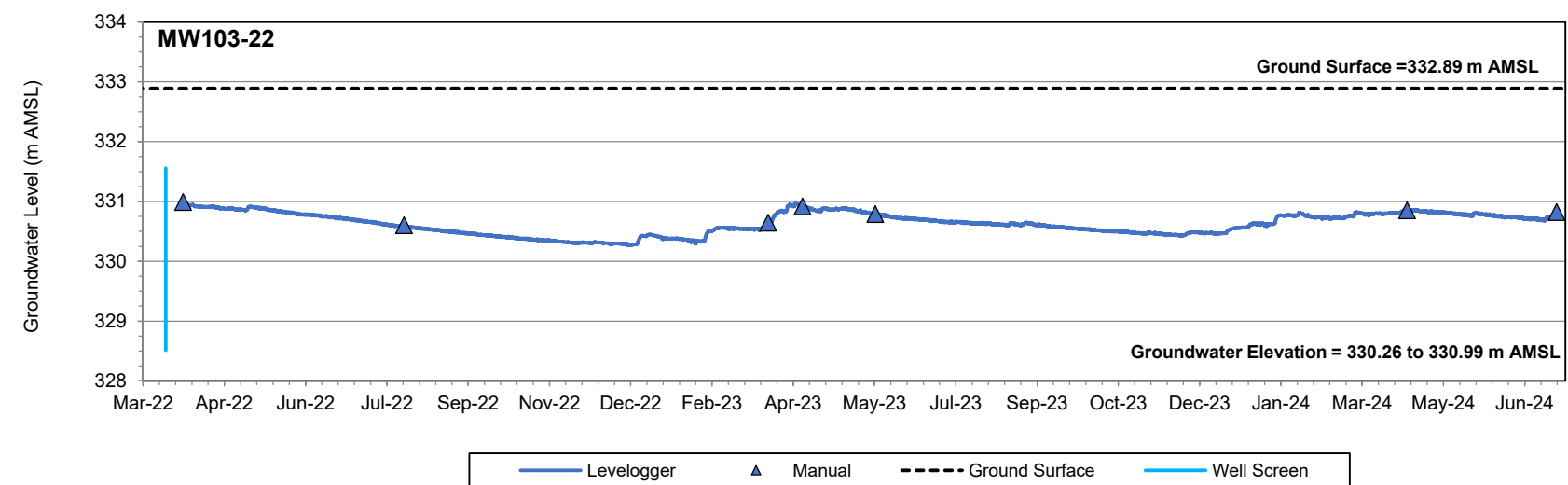
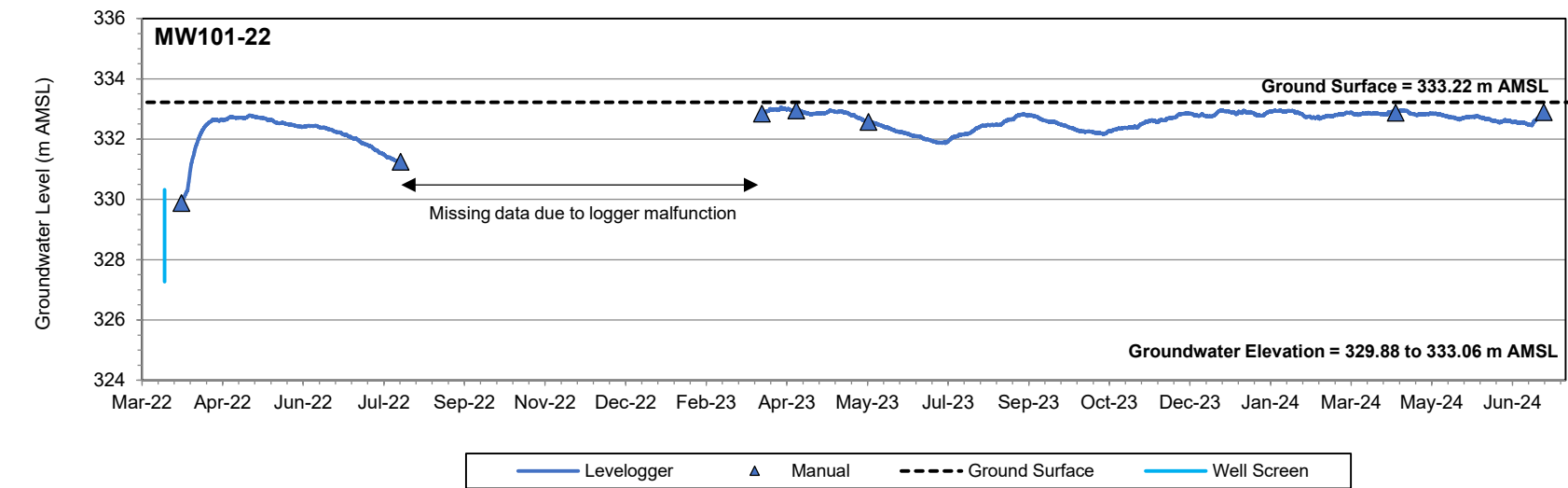
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SUPPLEMENTARY GROUNDWATER MONITORING
400 MILLENNIUM BOULEVARD, WATERLOO

Figure No.
3

Title
Surficial Geology



Notes:

Precipitation and temperature data obtained from Environment Canada for the Kitchener-Waterloo Climate Station (Station ID 6144239). Accessed July 2024.

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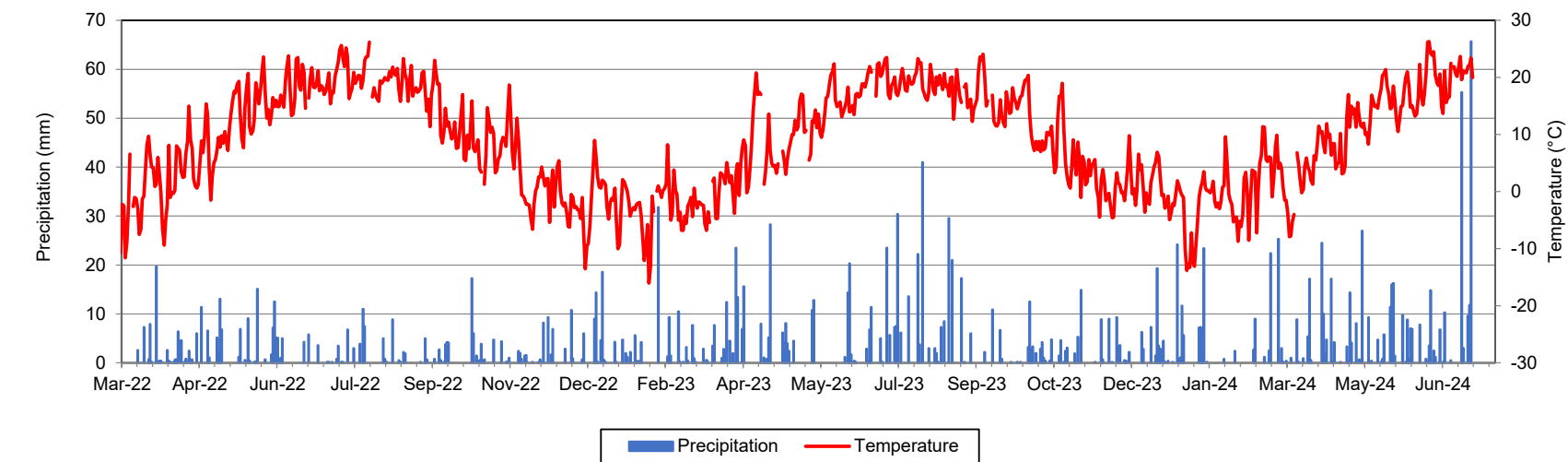
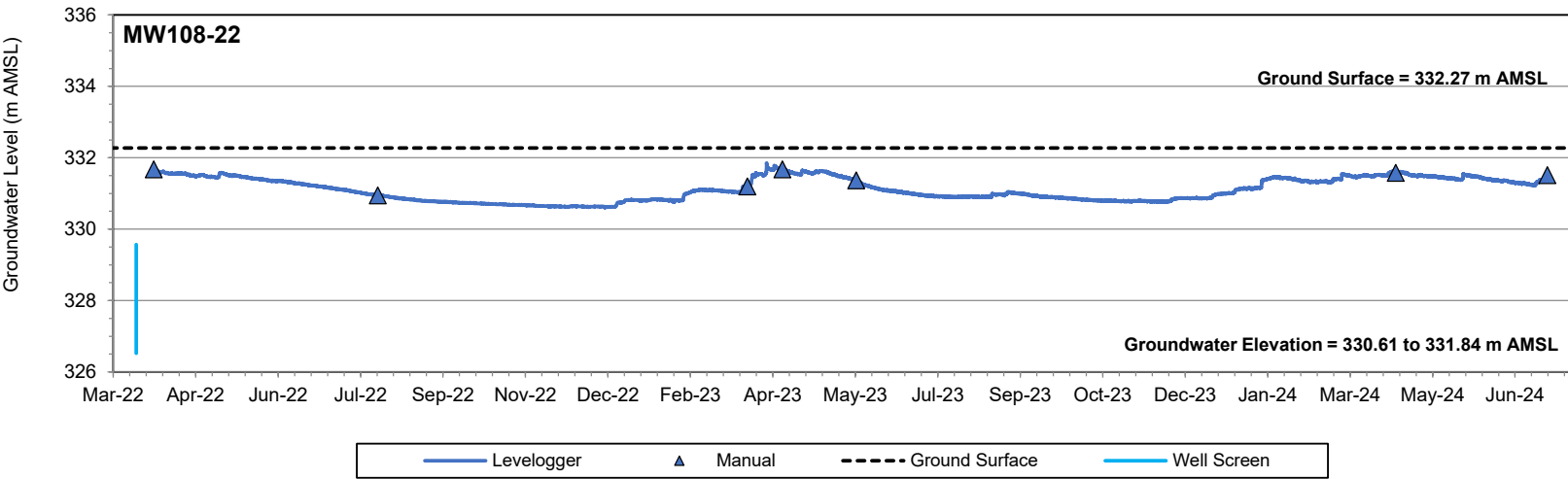
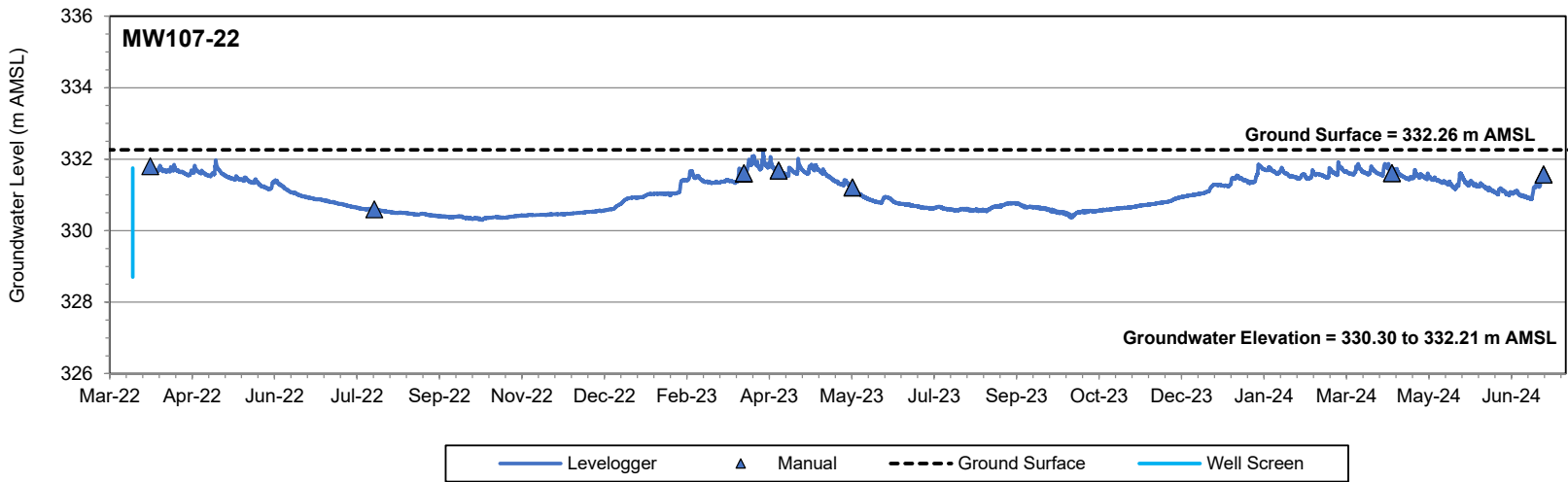
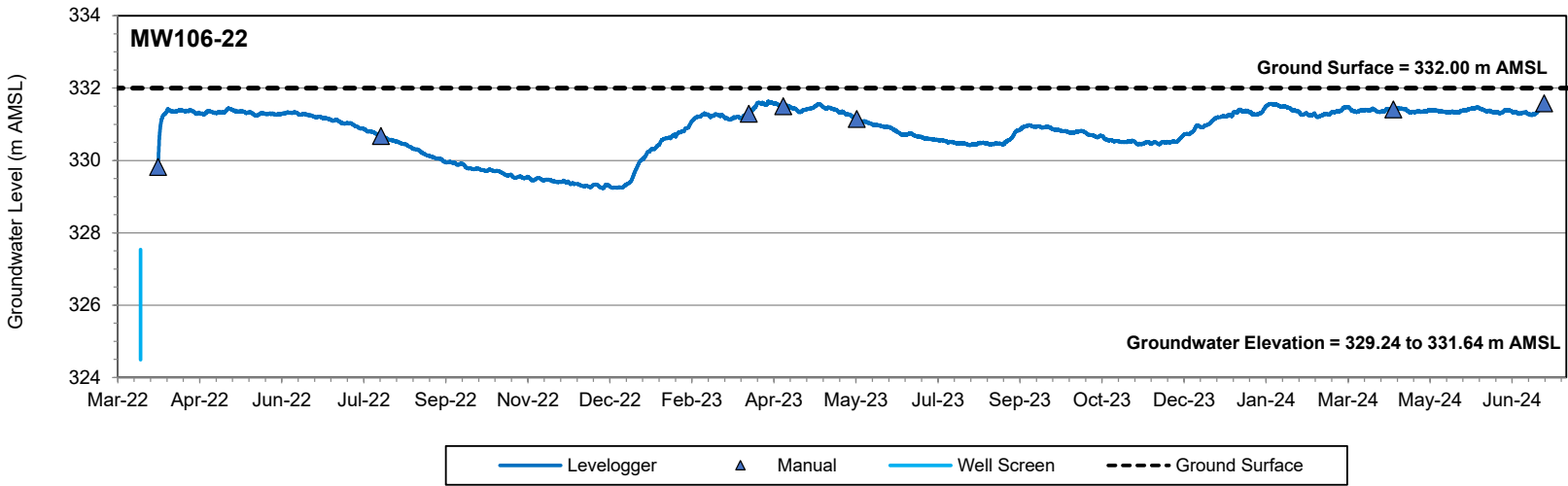
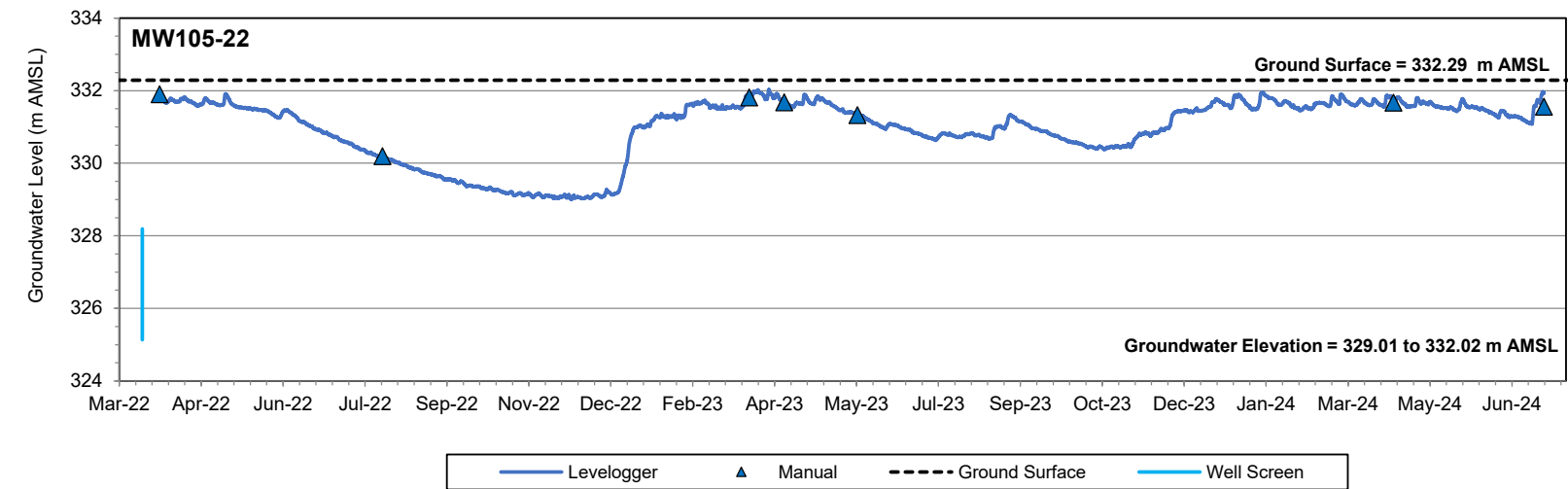
Activa Holdings, Inc
Supplementary Groundwater Monitoring
400 Millennium Boulevard, Waterloo

Figure No.

4

Title

HYDROGRAPHS
MW101-22 to MW104-22



Notes:

Precipitation and temperature data obtained from Environment Canada for the Kitchener-Waterloo Climate Station (Station ID 6144239). Accessed July 2024.

Client/Project

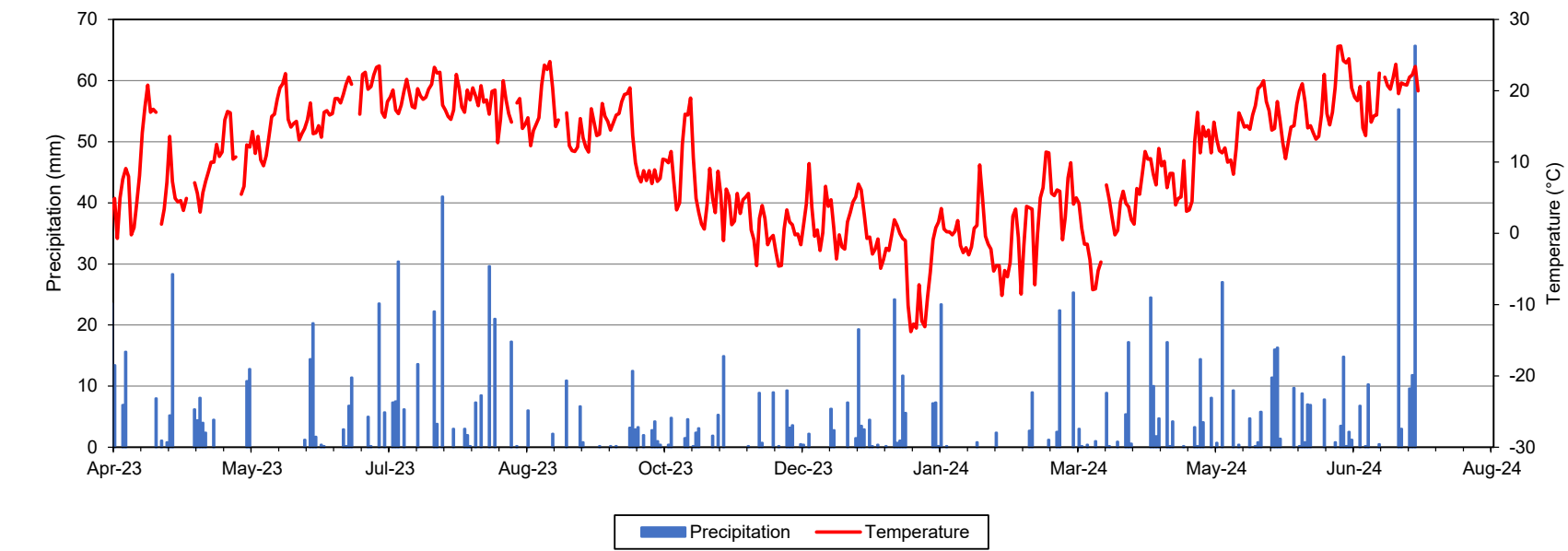
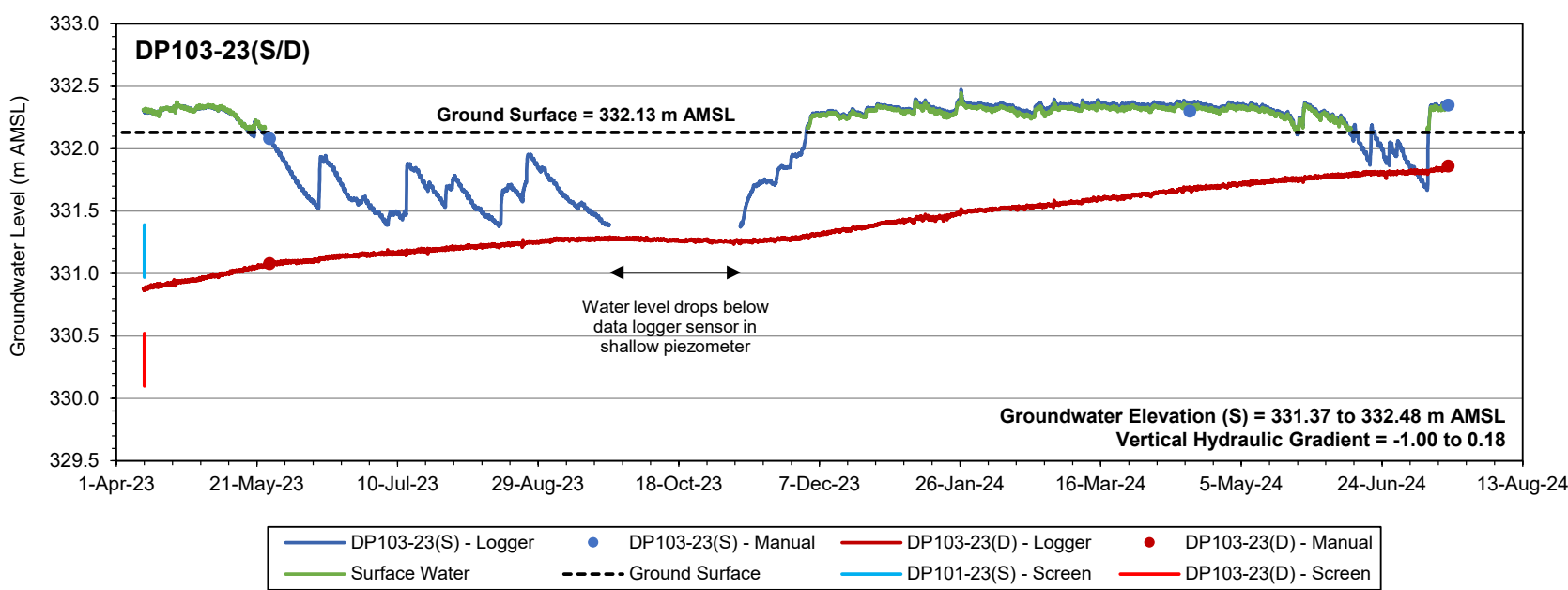
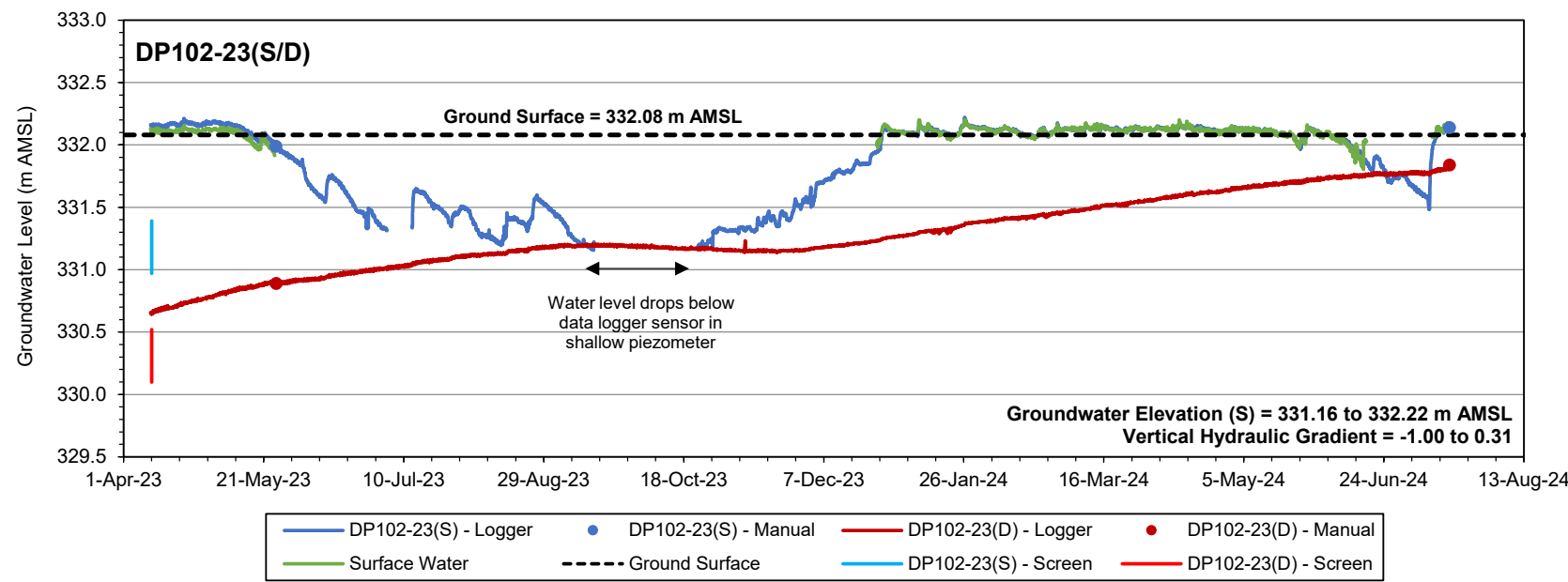
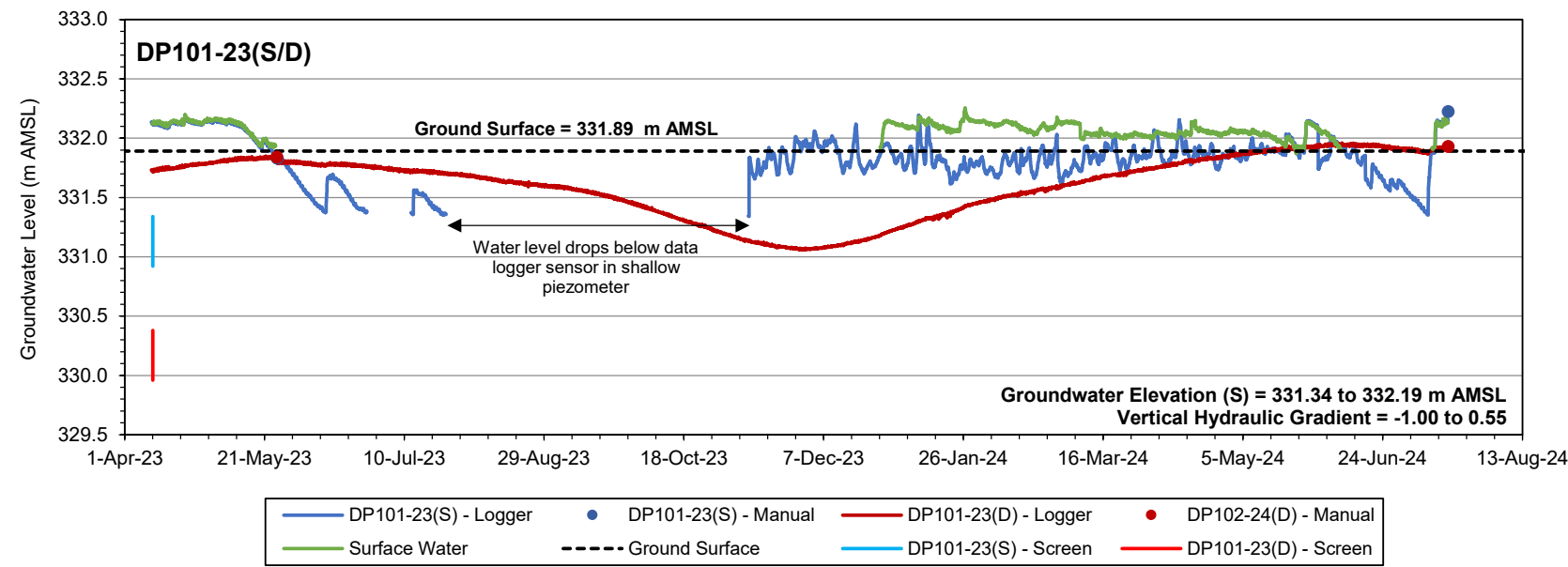
Activa Holdings, Inc
Supplementary Groundwater Monitoring
400 Millennium Boulevard, Waterloo

Figure No.

5

Title

HYDROGRAPHS
MW5-02 to MW103-22



Notes:

- 1) Precipitation and temperature data obtained from Environment Canada for the Kitchener-Waterloo Climate Station (Station ID 6144239). Accessed November 2024.
- 2) Unrepresentative dry and freezing data have been removed from the hydrographs.

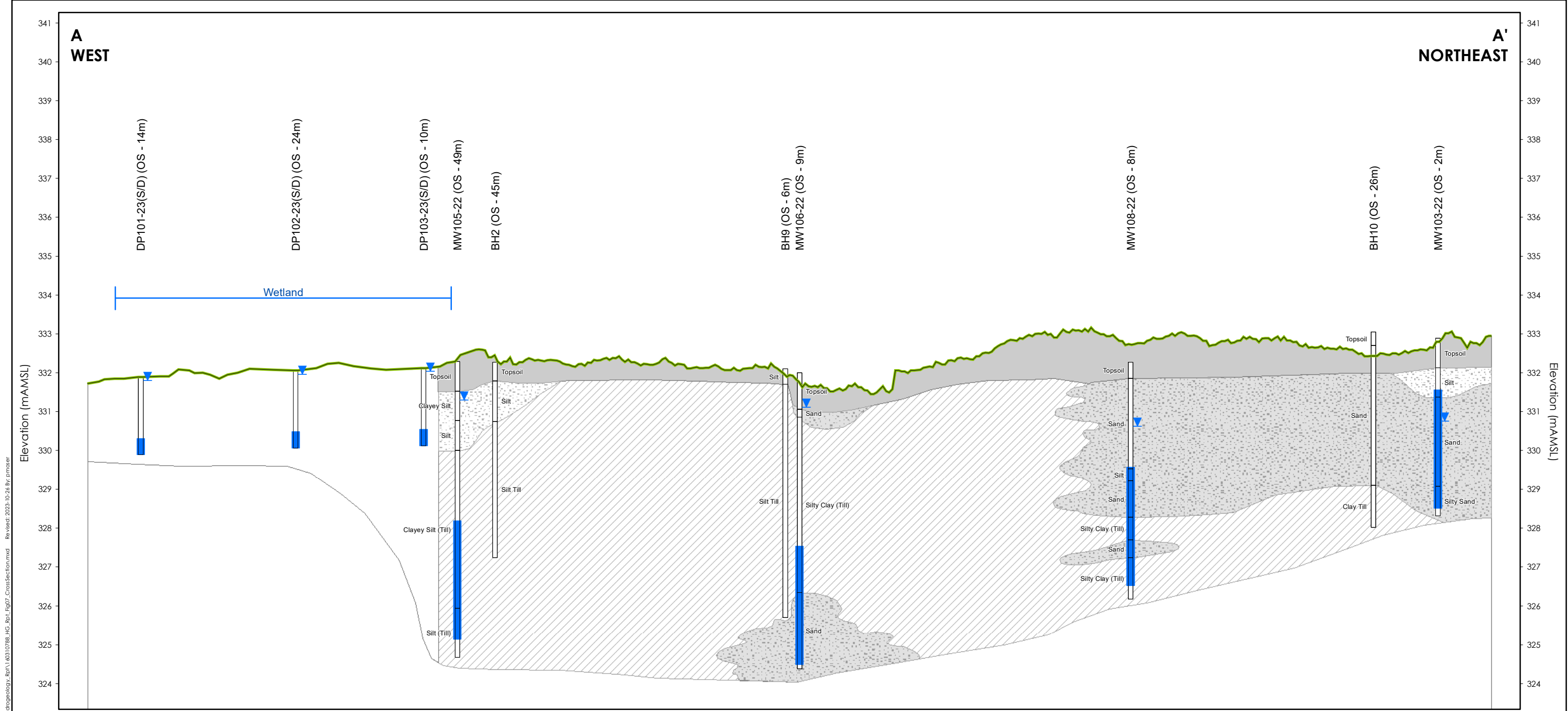
Client/Project
Activa Holdings, Inc
Supplementary Groundwater Monitoring
400 Millennium Boulevard, Waterloo

Figure No.

6

Title
HYDROGRAPHS
DP101-23 to DP103-23





Notes

1. Groundwater elevations measured by Stantec on May 25, 2023.

2. Topography derived from the Southwestern Ontario Orthophotography Project (2015) – Breaklines and Masspoints data © Queen's Printer for Ontario, 2015.

Well ID (Offset)

Stratigraphy

Water Level (May 25, 2023)

Well Screen

Legend

Topsoil (Silt)

Ice-Contact Stratified Deposits (Silty Sand to Sand)

Port Stanley Till (Sandy Silt to Silty Sand Till) and/or Upper Maryhill Till (Clayey Silt to Silty Clay Till)

Silt

Insufficient Information

Surficial Geology

5b: Stone-poor, carbonate-derived silty to sandy till

25x Vertical Exaggeration

0 40 80 metres

1:2,500 (At original document size of 11x17)



Project Location
Waterloo, ON

160310788 REV A
Prepared by pmoser on 2023-10-26
Technical Review by GW on 2023-10-26

Client/Project
ACTIVA HOLDINGS INC.
SUPPLEMENTARY GROUNDWATER MONITORING
400 MILLENNIUM BOULEVARD, WATERLOO

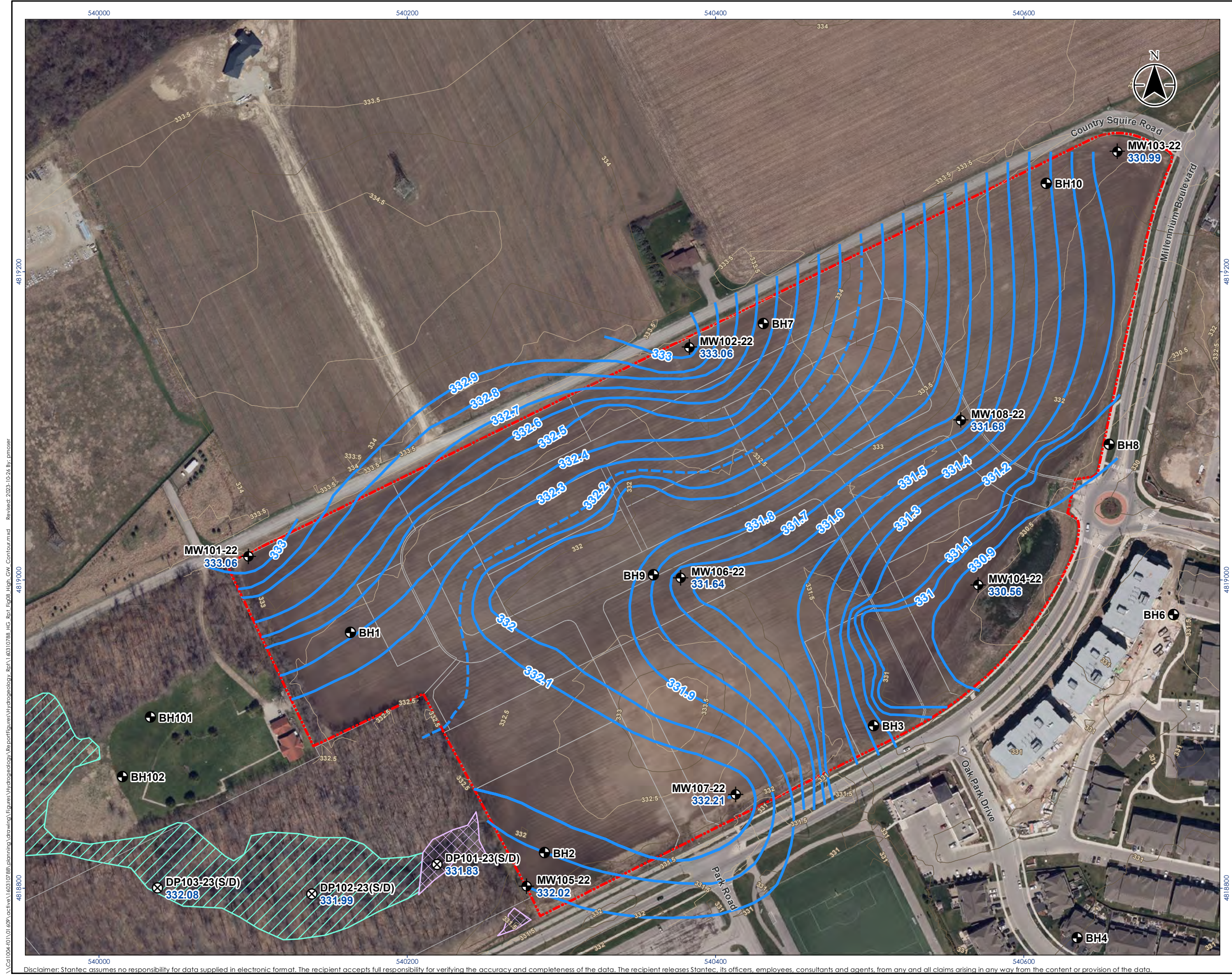
Figure No.

7

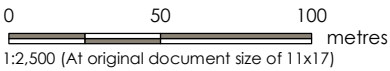
Title

Cross-Section A-A'

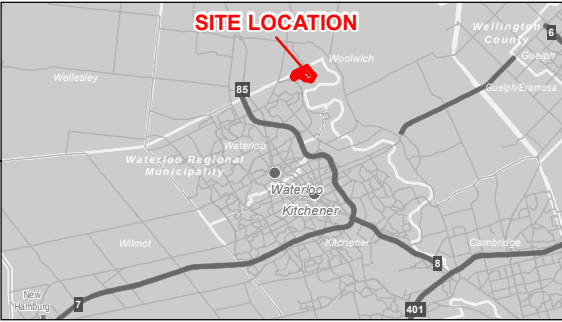
Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.



- 330.65 Groundwater Elevation (m AMSL)
- Monitoring Well (Stantec, 2022)
- Borehole (Naylor, 2006)
- Drive-point Piezometer (Stantec, 2022)
- Proposed Site Plan
- High Groundwater Contour
- Topographic Contour (1m Interval)
- Topographic Contour (0.5m Interval)
- Wetland - Not evaluated per Ontario Wetland Evaluation System
- Wetland - Evaluated (GRCA)
- Site Boundary



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 17N
 2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2017.
 3. Orthimagery © First Base Solutions, 2022, Imagery Date, 2020.
 4. Groundwater contours derived using highest groundwater elevations observed in on-site monitoring wells and drive-point piezometers between March 2022 and May 2023.



Project Location
Waterloo, ON

160310788 REV F
Prepared by PRM on 2023-10-26
Technical Review by GW on 2023-10-26

Client/Project
ACTIVA HOLDINGS INC.
SUPPLEMENTARY GROUNDWATER MONITORING
400 MILLENNIUM BOULEVARD, WATERLOO

Figure No.
8

Title
High Groundwater Contours

\\Cd\1004\101\01_009\active\160310788\planning\drawing\Figures\Hydrogeology\Report\Figures\Hydrogeology_Rpt1_160310788_HG_Rpt_Fig08_High_GW_Contours.mxd Revised: 2023-10-26 By: pmoser

May 12, 2025
Peter Armbruster

Reference: Hydrogeological Technical Memorandum, Supplementary Groundwater Monitoring and Wetland Assessment, Carriage Crossing
Subdivision (400 Millenium Boulevard), Blocks 320 and 326 (Registered Plan 58M-506), Waterloo, Ontario

Attachment 2 Tables

TABLE 1
WELL CONSTRUCTION DETAILS

Well ID	UTM Coordinates		Elevations		Source	Well Stick-up (m)	Well Depth (m BTOC)	Well Depth (m BGS)	Well Base Elevation (m AMSL)	Screened Interval				Screened Material Description ^(a) (% of Screened Interval)
	Northing	Easting	Top of Casing (m AMSL)	Ground Surface (m AMSL)						Top Elevation (m BGS) (m AMSL)		Bottom Elevation (m BGS) (m AMSL)		
MONITORING WELLS														
MW101-22	4819015	540097	334.34	333.22	Stantec, 2022	1.12	7.07	5.95	327.27	2.90	330.32	5.95	327.27	CLAYEY SILT TILL (50%), SILT TILL (50%)
MW102-22	4819151	540383	334.37	333.25	Stantec, 2022	1.12	5.42	4.30	328.95	1.25	332.00	4.30	328.95	SAND (100%), CLAYEY SILT TILL (50%)
MW103-22	4819278	540661	333.90	332.89	Stantec, 2022	1.01	5.39	4.38	328.51	1.33	331.56	4.38	328.51	SAND (75%), SILTY SAND (25%)
MW104-22	4818997	540570	331.44	330.52	Stantec, 2022	0.92	7.56	6.64	323.88	3.59	326.93	6.64	323.88	SILTY CLAY TILL (100%)
MW105-22	4818801	540277	333.29	332.29	Stantec, 2022	1.00	8.15	7.15	325.14	4.10	328.19	7.15	325.14	CLAYEY SILT TILL (67%), SILT TILL (33%)
MW106-22	4819001	540377	332.90	332.00	Stantec, 2022	0.90	8.41	7.51	324.49	4.46	327.54	7.51	324.49	SILTY CLAY TILL (50%), SAND (50%)
MW107-22	4818861	540413	333.35	332.26	Stantec, 2022	1.09	4.65	3.56	328.70	0.51	331.75	3.56	328.70	CLAYEY SILT (40%), SAND (40%), SILT TILL (20%)
MW108-22	4819104	540559	333.17	332.27	Stantec, 2022	0.90	6.65	5.75	326.52	2.70	329.57	5.75	326.52	SAND (50%), SILTY CLAY TILL (50%)
			333.89	332.27	Field Measurement, 2023	1.62	6.65	5.03	327.24	1.98	330.29	5.03	327.24	
DRIVE-POINT PIEZOMETERS														
DP101-23(S)	4818815	540219	333.16	331.89	-	1.27	2.24	0.97	330.92	0.55	331.34	0.97	330.92	-
DP101-23(D)	4818815	540220	333.44	331.88	-	1.56	3.48	1.92	329.96	1.50	330.38	1.92	329.96	-
DP102-23(S)	4818796	540138	333.52	332.06	-	1.46	2.55	1.09	330.97	0.67	331.39	1.09	330.97	-
DP102-23(D)	4818796	540138	333.57	332.10	-	1.47	3.47	2.00	330.10	1.58	330.52	2.00	330.10	-
DP103-23(S)	4818800	540038	333.55	332.12	-	1.43	2.58	1.15	330.97	0.73	331.39	1.15	330.97	-
DP103-23(D)	4818800	540038	333.72	332.15	-	1.57	3.47	1.90	330.25	1.48	330.67	1.90	330.25	-

Notes:
(a) Refer to Attachment C for borehole and well construction logs

m AMSL = meters above mean sea level
m BGS = meters below ground surface
m BTOC = meters below top of well casing
- = data not available

TABLE 2
GROUNDWATER LEVEL DATA - MONITORING WELLS

Well ID	Date	Time	Well Depth			Screen Length	Top of Casing Elevation	Ground Surface Elevation	Pipe Stick-up	Groundwater Level		
			(m BTOC)	(m BGS)	(m AMSL)					(m BGS) ⁽¹⁾	(m BTOC)	(m AMSL)
MW101-22	25-Mar-22	12:15 PM	7.07	5.95	327.27	3.05	334.34	333.22	1.12	3.34	4.46	329.88
	8-Aug-22	10:00 AM								1.97	3.09	331.25
	2-Dec-22	11:32 AM								2.64	3.76	330.58
	20-Mar-23	12:45 PM								0.37	1.49	332.85
	10-Apr-23	5:44 PM								0.27	1.39	332.95
	25-May-23	12:44 PM								0.64	1.76	332.58
	16-Apr-24	1:45 PM								0.34	1.46	332.88
	17-Jul-24	1:45 PM								0.32	1.44	332.90
MW102-22	25-Mar-22	1:41 PM	5.42	4.30	328.95	3.05	334.37	333.25	1.12	0.85	1.97	332.40
	8-Aug-22	10:37 AM								2.16	3.28	331.09
	2-Dec-22	11:50 AM								2.40	3.52	330.85
	20-Mar-23	1:04 PM								1.30	2.42	331.95
	10-Apr-23	5:33 PM								1.02	2.14	332.23
	25-May-23	12:52 PM								1.65	2.77	331.60
	16-Apr-24	1:40 PM								1.10	2.22	332.15
	17-Jul-24	11:49 AM								0.91	2.03	332.34
MW103-22	25-Mar-22	2:30 PM	5.39	4.38	328.51	3.05	333.90	332.89	1.01	1.90	2.91	330.99
	8-Aug-22	11:03 AM								2.29	3.30	330.60
	2-Dec-22	12:03 PM								2.57	3.58	330.32
	20-Mar-23	1:22 PM								2.25	3.26	330.64
	10-Apr-23	5:49 PM								1.91	2.92	330.98
	25-May-23	1:00 PM								2.10	3.11	330.79
	17-Jul-24	1:32 PM								2.04	3.05	330.85
MW104-22	25-Mar-22	3:20 PM	7.56	6.64	323.88	3.05	331.44	330.52	0.92	0.02	0.94	330.50
	8-Aug-22	11:37 AM								0.52	1.44	330.00
	2-Dec-22	12:29 PM								1.36	2.28	329.16
	20-Mar-23	2:26 PM								0.39	1.31	330.13
	10-Apr-23	6:02 PM								-0.02	0.90	330.54
	25-May-23	12:06 PM								0.23	1.15	330.29
	16-Apr-24	1:05 PM								-0.24	0.68	330.76
	17-Jul-24	1:07 PM								-0.14	0.78	330.66
MW105-22	25-Mar-22	4:20 PM	8.15	7.15	325.14	3.05	333.29	332.29	1.00	0.38	1.38	331.91
	8-Aug-22	-								2.09	3.09	330.20
	2-Dec-22	1:02 PM								3.23	4.23	329.06
	20-Mar-23	11:54 AM								0.48	1.48	331.81
	10-Apr-23	5:13 PM								0.61	1.61	331.68
	25-May-23	1:14 PM								0.96	1.96	331.33
	16-Apr-24	2:10 PM								0.62	1.62	331.67
	17-Jul-24	1:47 PM								0.72	1.72	331.57
MW106-22	25-Mar-22	1:22 PM	8.41	7.51	324.49	3.05	332.90	332.00	0.90	2.18	3.08	329.82
	8-Aug-22	10:45 AM								1.32	2.22	330.68
	2-Dec-22	12:51 PM								2.68	3.58	329.32
	20-Mar-23	3:23 PM								0.70	1.60	331.30
	10-Apr-23	5:28 PM								0.50	1.40	331.50
	25-May-23	12:27 PM								0.85	1.75	331.15
	16-Apr-24	12:56 PM								0.59	1.49	331.41
	17-Jul-24	12:17 PM								0.42	1.32	331.58
MW107-22	25-Mar-22	3:49 PM	4.65	3.56	328.70	3.05	333.35	332.26	1.09	0.46	1.55	331.80
	8-Aug-22	11:44 AM								1.66	2.75	330.60
	2-Dec-22	12:39 PM								1.78	2.87	330.48
	20-Mar-23	3:53 PM								0.66	1.75	331.60
	10-Apr-23	5:21 PM								0.58	1.67	331.68
	25-May-23	11:29 AM								1.04	2.13	331.22
	16-Apr-24	1:56 PM								0.65	1.74	331.61
	17-Jul-24	1:29 PM								0.69	1.78	331.57
MW108-22	25-Mar-22	2:50 PM	6.65	5.75	326.52	3.05	333.17	332.27	0.90	0.59	1.49	331.68
	8-Aug-22	11:17 AM								1.32	2.94	330.95
	2-Dec-22	12:39 PM								1.64	3.26	330.63
	20-Mar-23	2:07 PM								1.06	2.68	331.21
	10-Apr-23	5:56 PM								0.59	2.21	331.68
	25-May-23	12:15 PM								0.90	2.52	331.37
	16-Apr-24	1:25 PM								0.69	2.31	331.58
	17-Jul-24	12:32 PM								0.75	2.37	331.52

Notes:

m BGS = meters below ground surface
m BTOC = meters below top of casing
m AMSL = meters above mean sea level

TABLE 3
GROUNDWATER LEVELS - DRIVE-POINT PIEZOMETERS

Piezometer ID	Depth		Screen Length (m)	Screen Separation ⁽¹⁾ (m)	Pipe Stick-up (m)	Ground Surface Elevation (m AMSL)	Top of Casing Elevation (m AMSL)	Date	Time	Groundwater Level			Surface Water Level		Vertical Hydraulic Gradient ⁽²⁾ (+) = Upward (-) = Downward
	(m BTOC)	(m BGS)								(m BGS)	(m BTOC)	(m AMSL)	(m BTOC)	(m AMSL)	
DP101-23(S)	2.24	0.97	0.42		1.27	331.89	333.16	10-Apr-23 25-May-23 16-Apr-24 17-Jul-24	7:18 PM 10:20 AM 2:40 PM 10:14 AM	- 0.06 -0.15 -0.34	- 1.33 1.12 0.93	- 331.83 332.04 332.23	1.03 DRY 1.02 1.03	332.13 - 332.14 332.13	
DP101-23(D)	3.48	1.92	0.42	0.95	1.56	331.88	333.44	10-Apr-23 25-May-23 16-Apr-24 17-Jul-24	7:18 PM 10:31 AM 2:40 PM 10:01 AM	- 0.04 0.13 -0.05	- 1.60 1.69 1.51	- 331.84 331.75 331.93	- - - -	- - - -	- 0.00 -0.31 -0.32
DP102-23(S)	2.55	1.09	0.42		1.46	332.06	333.52	10-Apr-23 25-May-23 16-Apr-24 17-Jul-24	2:15 PM 10:45 AM 2:50 PM 10:45 AM	- 0.07 0.03 -0.08	- 1.53 1.49 1.38	- 331.99 332.03 332.14	1.39 DRY 1.39 1.38	332.13 - 332.13 332.14	
DP102-23(D)	3.47	2.00	0.42	0.91	1.47	332.10	333.57	10-Apr-23 25-May-23 16-Apr-24 17-Jul-24	- 10:51 AM 2:50 PM 10:36 AM	- 1.21 0.62 0.27	- 2.68 2.09 1.74	- 330.89 331.48 331.83	- - - -	- - - -	- -1.00 -0.60 -0.34
DP103-23(S)	2.58	1.15	0.42		1.43	332.12	333.55	10-Apr-23 25-May-23 16-Apr-24 17-Jul-24	4:30 PM 11:03 AM 3:08 PM 11:07 AM	- 0.04 -0.18 -0.23	- 1.47 1.25 1.20	- 332.08 332.30 332.35	1.23 DRY 1.21 1.21	332.32 - 332.34 332.34	
DP103-23(D)	3.47	1.90	0.42	0.75	1.57	332.15	333.72	10-Apr-23 25-May-23 16-Apr-24 17-Jul-24	- 11:06 AM 3:08 PM 11:05 AM	- 1.07 0.58 0.29	- 2.64 2.15 1.86	- 331.08 331.57 331.86	- - - -	- - - -	- -1.00 -0.97 -0.65

Notes:
(1) Distance between the mid-point of the screened intervals of the shallow and deep piezometer.
(2) Vertical hydraulic gradient between the mid-points of the shallow and deep piezometer screen.

m BGS = meters below ground surface
m BTOC = meters below top of casing
m AMSL = m above mean sea level
DRY = no groundwater or surface water was observed in the piezometer or watercourse, respectively
- = measurement not available

May 12, 2025
Peter Armbruster

Reference: Hydrogeological Technical Memorandum, Supplementary Groundwater Monitoring and Wetland Assessment, Carriage Crossing
Subdivision (400 Millenium Boulevard), Blocks 320 and 326 (Registered Plan 58M-506), Waterloo, Ontario

Attachment 3 Borehole Logs

Monitoring Well: MW101-22

Project: Supplementary Groundwater Monitoring
Client: Activa Holdings Inc.
Location: 400 Millennium Blvd., Waterloo ON
Number: 160310788
Field investigator: J. Hale
Contractor: Aardvark Drilling Inc.

Method: CME 850 - Hollow Stem Auger/Split Spoon
Date started/completed: 15-Mar-2022
Ground surface elevation: 333.22 m AMSL
Top of casing elevation: 334.34 m AMSL
Easting: 540097
Northing: 4819151

SUBSURFACE PROFILE				SAMPLE DETAILS				INSTALLATION DETAILS	
Depth	Graphic Log	Stratigraphic Description	Elevation (m AMSL) Depth (m BGS)	Sample Number	Sample Type	Recovery	N Value	Diagram	Description
(ft)	(m)								
0	0	Ground Surface	333.22						
		TOPSOIL	0.00	1	SS	20" 83%	1-3-3-2 (6)		← Above Ground Casing 1.12 m stick-up
		Clayey silt, trace sand, gravel and organics, very moist	332.46						
		SANDY SILT (TILL)	0.76	2	SS	22" 92%	1-2-3-3 (5)		
		Trace gravel, light brown, firm to stiff, very moist, well graded							
5	2	Very stiff		3	SS	20" 83%	1-6-10-10 (16)		← Holeplug 0 to 2.60 m
				4	SS	24" 100%	4-13-11-10 (24)		← 203 mm Borehole Diameter 0 to 6.10 m
10		CLAYEY SILT (TILL)	330.17	5	SS	22" 92%	7-23-23-21 (46)		← Water Level 25-MAR-2022 3.34 m BGS
		Trace sand and gravel, light brown, hard, very moist							
4		Becomes wet at 3.96 m BGS		6	SS	18" 75%	7-25-28-24 (53)		← No.2 Silica Sand 2.60 to 6.10 m
15		SILT (TILL)	328.65	7	SS	18" 75%	7-24-35-35 (59)		← No. 10 Slot Schedule 40 PVC Screen 2.90 to 5.95 m
		Some clay, trace sand and gravel, hard, moist		8	SS	18" 75%	7-18-28-27 (46)		
20	6	End of Borehole	327.12						
			6.10						
25									

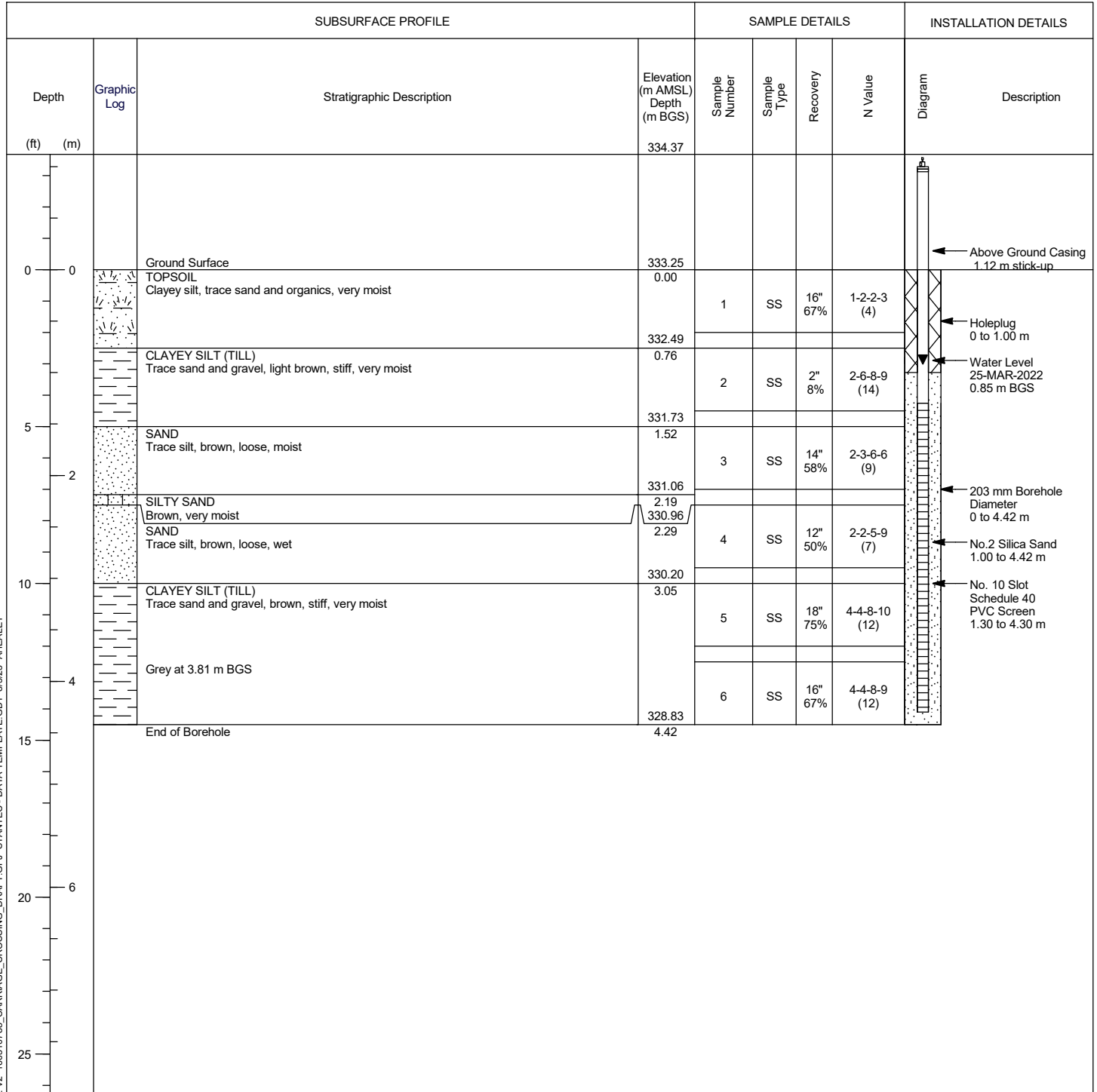
Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
SS - split-spoon sample
n/a - not available



Monitoring Well: MW102-22

Project: Supplementary Groundwater Monitoring
Client: Activa Holdings Inc.
Location: 400 Millennium Blvd., Waterloo ON
Number: 160310788
Field investigator: J. Hale
Contractor: Aardvark Drilling Inc.

Method: CME 850 - Hollow Stem Auger/Split Spoon
Date started/completed: 16-Mar-2022
Ground surface elevation: 333.25 m AMSL
Top of casing elevation: 334.37 m AMSL
Easting: 540383
Northing: 4819151



Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
SS - split-spoon sample
n/a - not available



Monitoring Well: MW103-22

Project: Supplementary Groundwater Monitoring
Client: Activa Holdings Inc.
Location: 400 Millennium Blvd., Waterloo ON
Number: 160310788
Field investigator: J. Hale
Contractor: Aardvark Drilling Inc.

Method: CME 850 - Hollow Stem Auger/Split Spoon
Date started/completed: 16-Mar-2022
Ground surface elevation: 332.89 m AMSL
Top of casing elevation: 333.90 m AMSL
Easting: 540661
Northing: 4819278

SUBSURFACE PROFILE				SAMPLE DETAILS				INSTALLATION DETAILS	
Depth	Graphic Log	Stratigraphic Description	Elevation (m AMSL) Depth (m BGS)	Sample Number	Sample Type	Recovery	N Value	Diagram	Description
(ft) (m)			333.90						
0	0	Ground Surface	332.89						← Above Ground Casing 1.01 m stick-up
		TOPSOIL Clayey silt, trace sand and organics, very moist	0.00	1	SS	18" 75%	1-2-3-2 (5)		← Holeplug 0 to 1.08 m
		SILT Some sand, light brown, firm, very moist	0.76	2	SS	16" 67%	1-3-4-6 (7)		
5		SAND Trace silt, brown, loose to compact, moist	1.52	3	SS	14" 58%	2-4-11-10 (15)		← Water Level 25-MAR-2022 1.90 m BGS
2		Wet from 2.29 to 3.81 m BGS		4	SS	16" 67%	1-3-3-4 (6)		← 203 mm Borehole Diameter 0 to 4.38 m
10				5	SS	22" 92%	4-8-6-9 (14)		← No. 2 Silica Sand 1.08 to 4.38 m
4		SILTY SAND Brown, compact, wet	3.81	6	SS	22" 92%	4-9-8-6 (17)		← No. 10 Slot Schedule 40 PVC Screen 1.38 to 4.38 m
15		End of Borehole	4.42						
20	6								
25									
8									

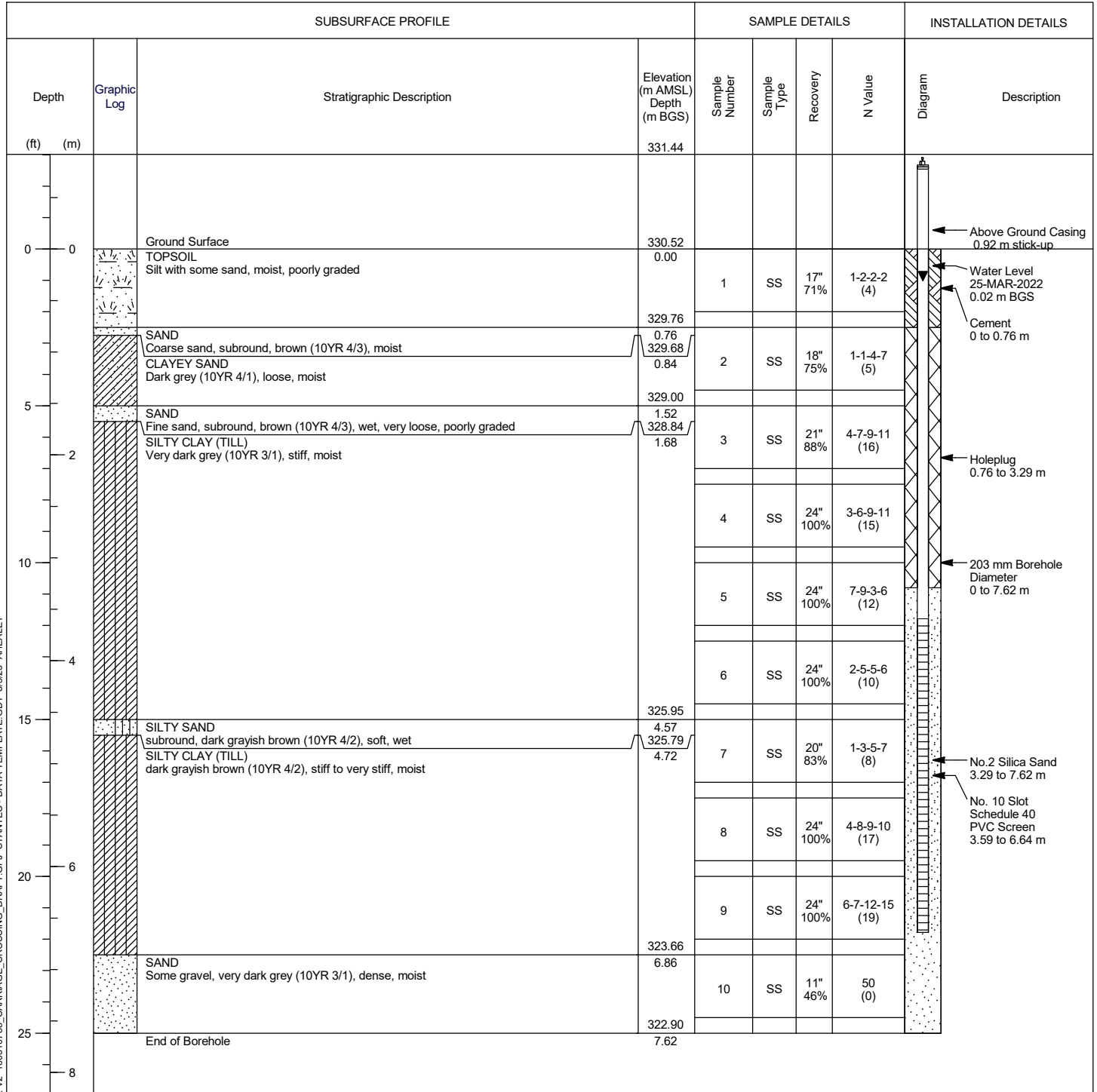
Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
SS - split-spoon sample
n/a - not available



Monitoring Well: MW104-22

Project: Supplementary Groundwater Monitoring
Client: Activa Holdings Inc.
Location: 400 Millennium Blvd., Waterloo ON
Number: 160310788
Field investigator: S. Hutchinson
Contractor: Aardvark Drilling Inc.

Method: CME 850 - Hollow Stem Auger/Split Spoon
Date started/completed: 22-Mar-2022
Ground surface elevation: 330.52 m AMSL
Top of casing elevation: 331.44 m AMSL
Easting: 540570
Northing: 4818997



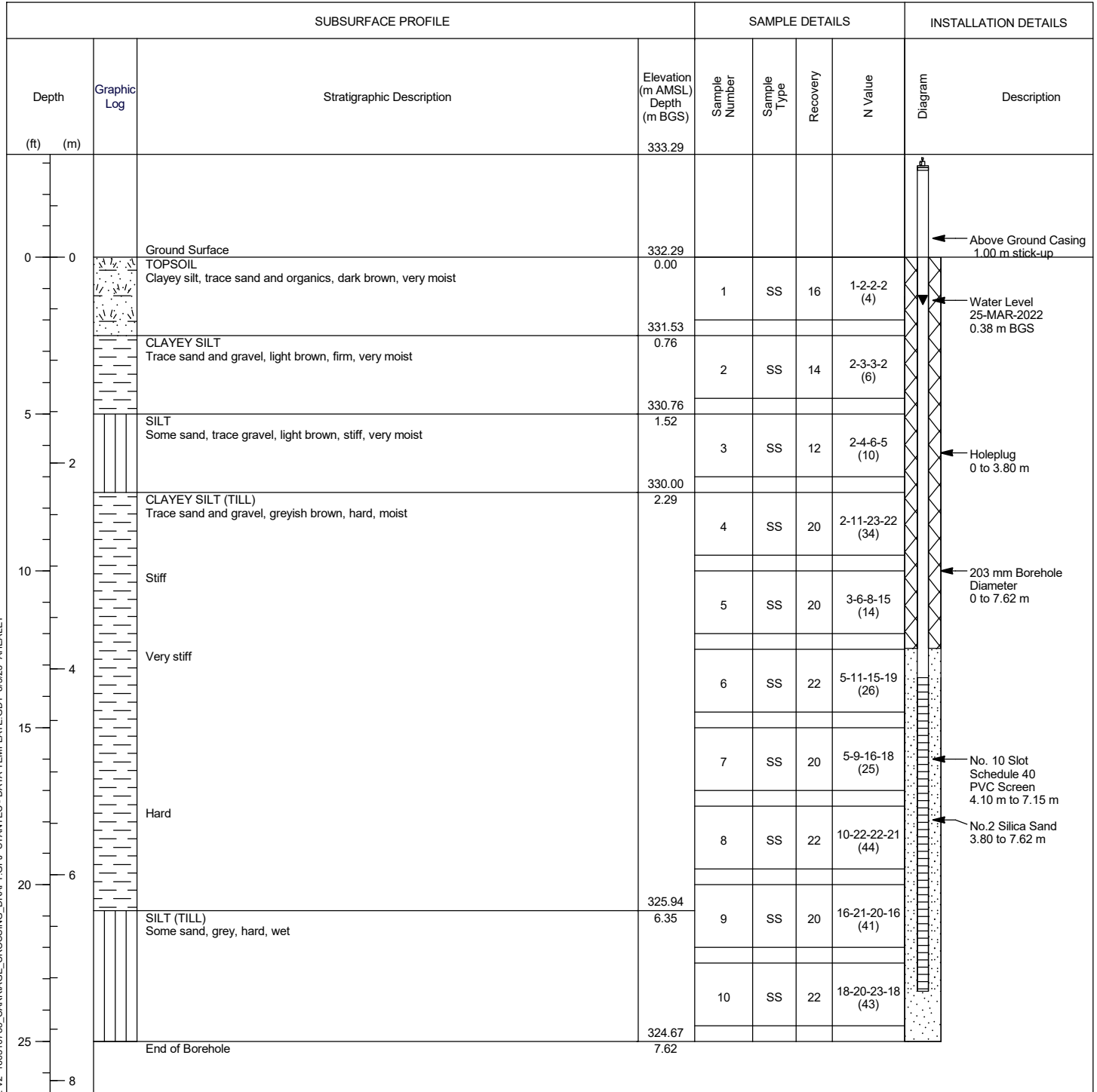
Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
SS - split-spoon sample
n/a - not available



Monitoring Well: MW105-22

Project: Supplementary Groundwater Monitoring
Client: Activa Holdings Inc.
Location: 400 Millennium Blvd., Waterloo ON
Number: 160310788
Field investigator: J. Hale
Contractor: Aardvark Drilling Inc.

Method: CME 850 - Hollow Stem Auger/Split Spoon
Date started/completed: 16-Mar-2022
Ground surface elevation: 332.29 m AMSL
Top of casing elevation: 333.29 m AMSL
Easting: 540277
Northing: 4818801



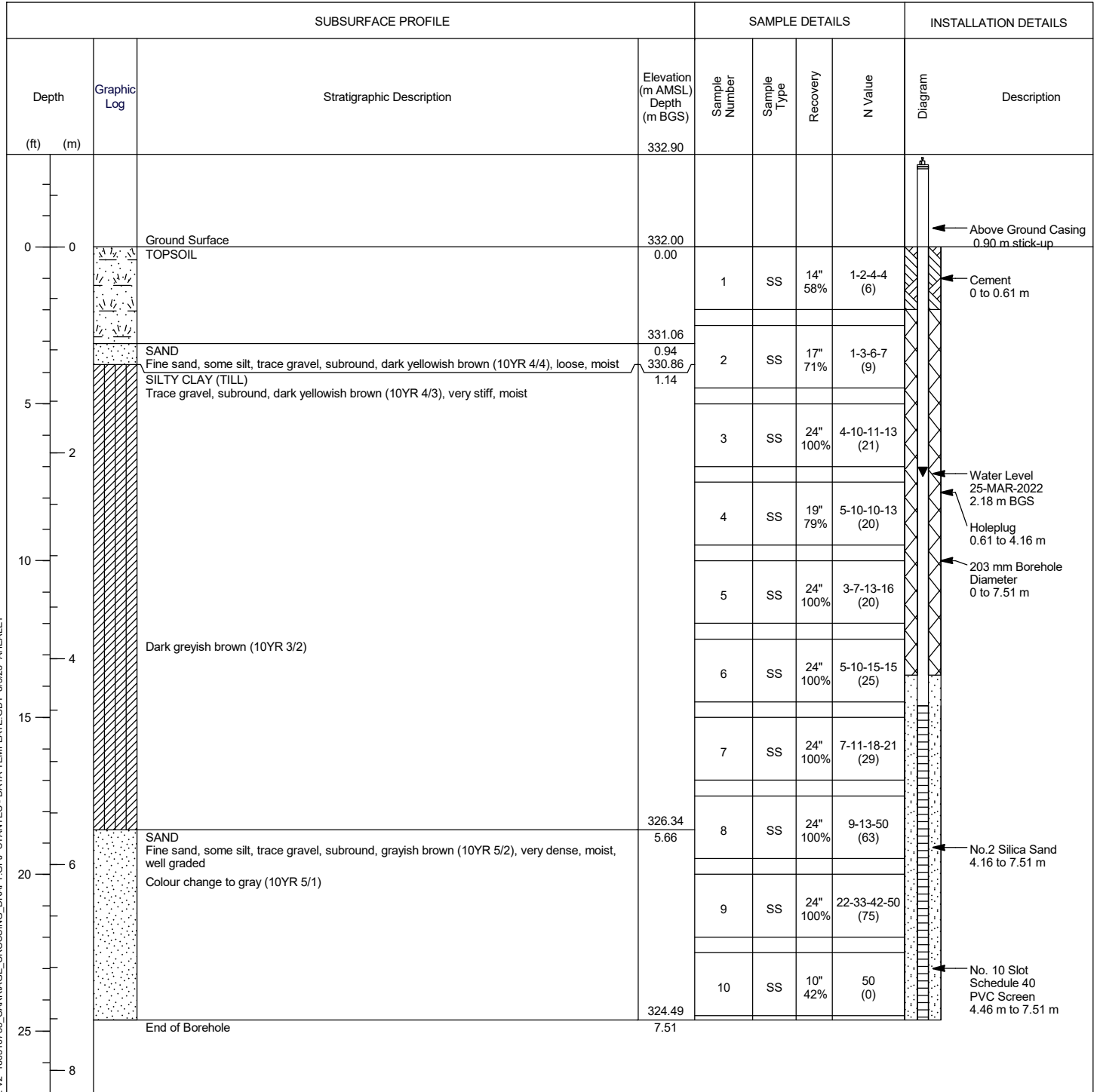
Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
SS - split-spoon sample
n/a - not available



Monitoring Well: MW106-22

Project: Supplementary Groundwater Monitoring
Client: Activa Holdings Inc.
Location: 400 Millennium Blvd., Waterloo ON
Number: 160310788
Field investigator: S. Hutchinson
Contractor: Aardvark Drilling Inc.

Method: CME 850 - Hollow Stem Auger/Split Spoon
Date started/completed: 16-Mar-2022
Ground surface elevation: 332.00 m AMSL
Top of casing elevation: 332.90 m AMSL
Easting: 540377
Northing: 4819001



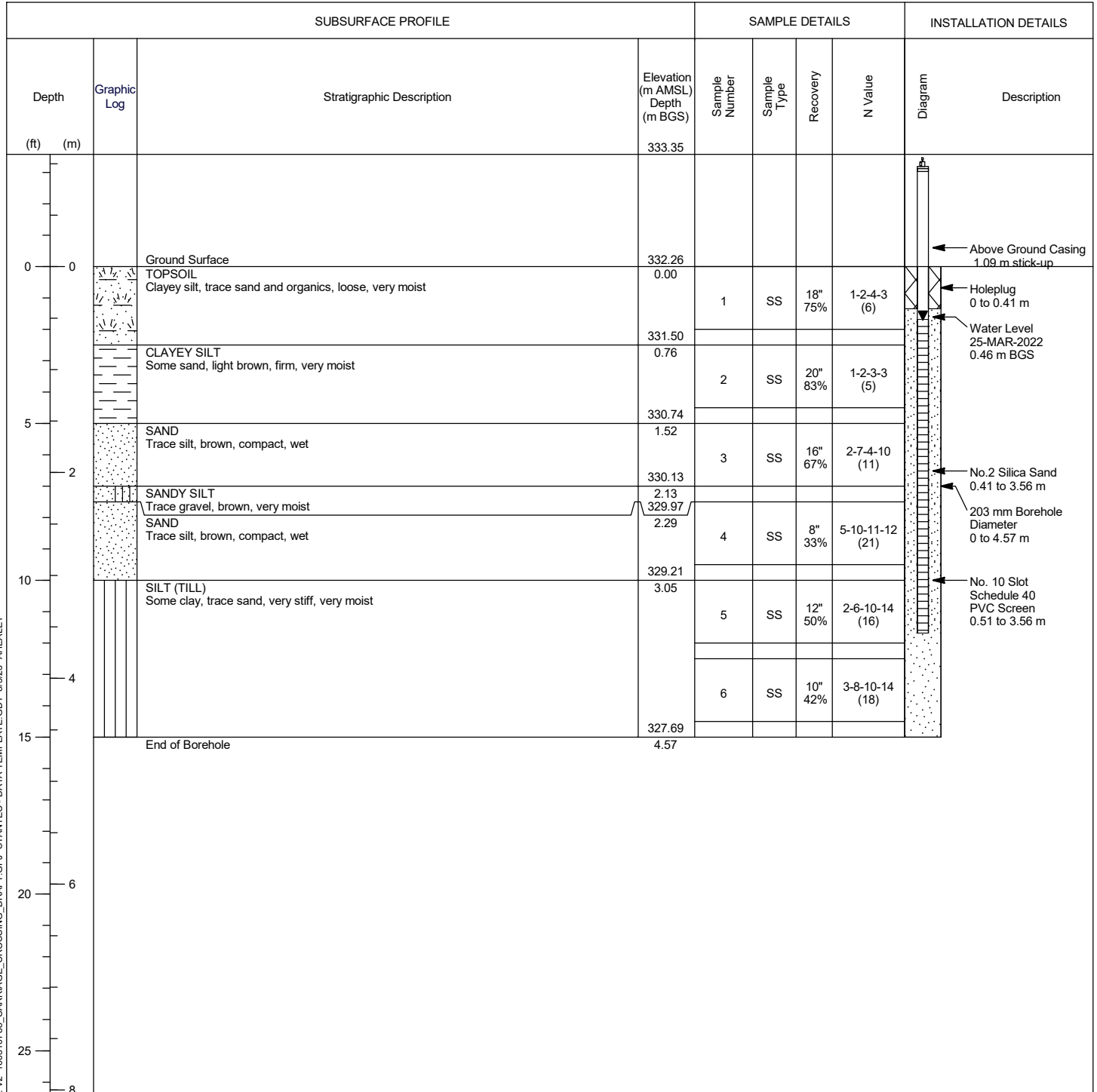
Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
SS - split-spoon sample
n/a - not available



Monitoring Well: MW107-22

Project: Supplementary Groundwater Monitoring
Client: Activa Holdings Inc.
Location: 400 Millennium Blvd., Waterloo ON
Number: 160310788
Field investigator: J. Hale
Contractor: Aardvark Drilling Inc.

Method: CME 850 - Hollow Stem Auger/Split Spoon
Date started/completed: 16-Mar-2022
Ground surface elevation: 332.26 m AMSL
Top of casing elevation: 333.35 m AMSL
Easting: 540413
Northing: 4818861



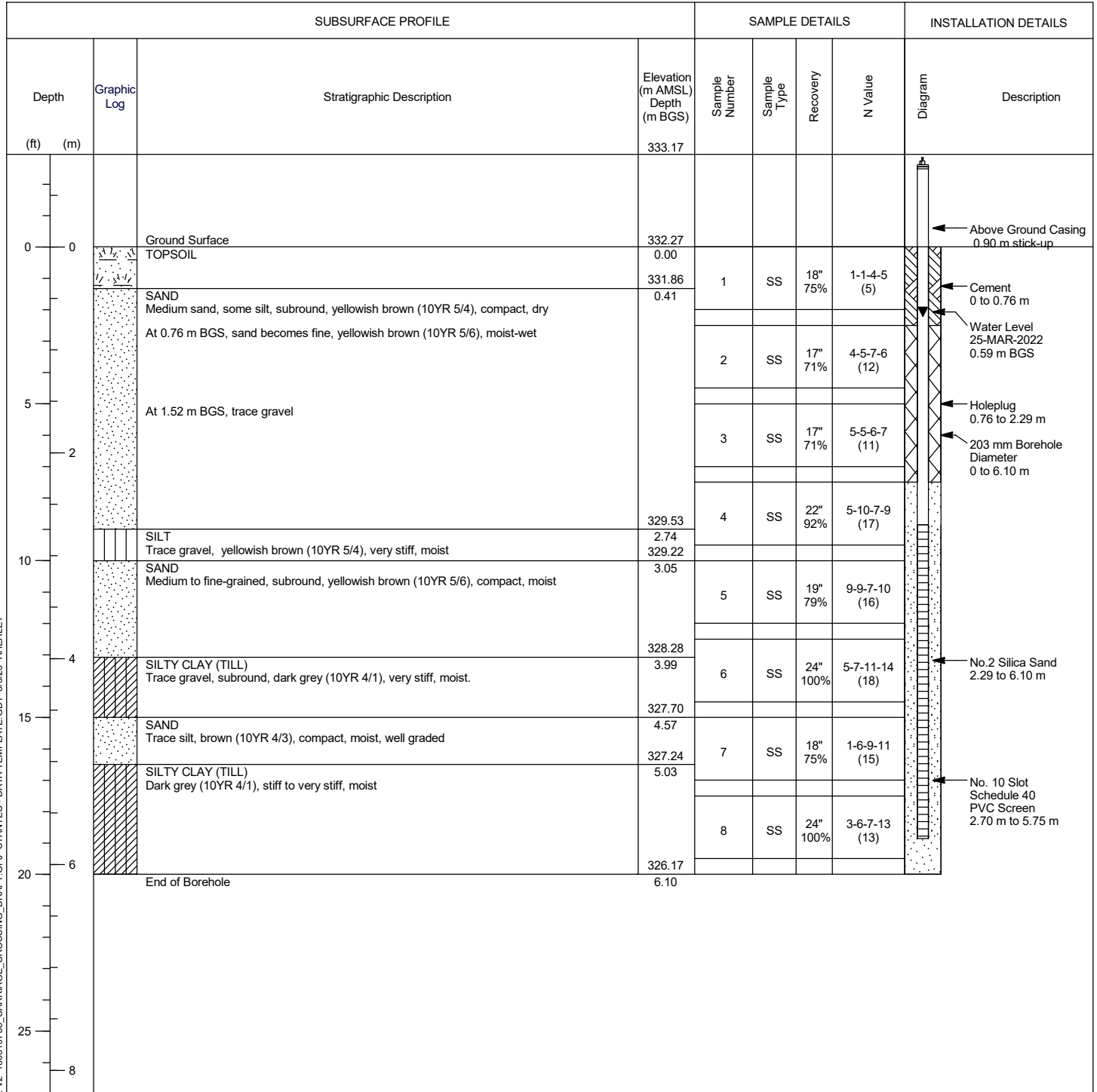
Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
SS - split-spoon sample
n/a - not available



Monitoring Well: MW108-22

Project: Supplementary Groundwater Monitoring
Client: Activa Holdings Inc.
Location: 400 Millennium Blvd., Waterloo ON
Number: 160310788
Field investigator: S. Hutchinson
Contractor: Aardvark Drilling Inc.

Method: CME 850 - Hollow Stem Auger/Split Spoon
Date started/completed: 22-Mar-2022
Ground surface elevation: 332.27 m AMSL
Top of casing elevation: 333.17 m AMSL
Easting: 540559
Northing: 4819104



Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
SS - split-spoon sample
n/a - not available





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Borehole Number: 1

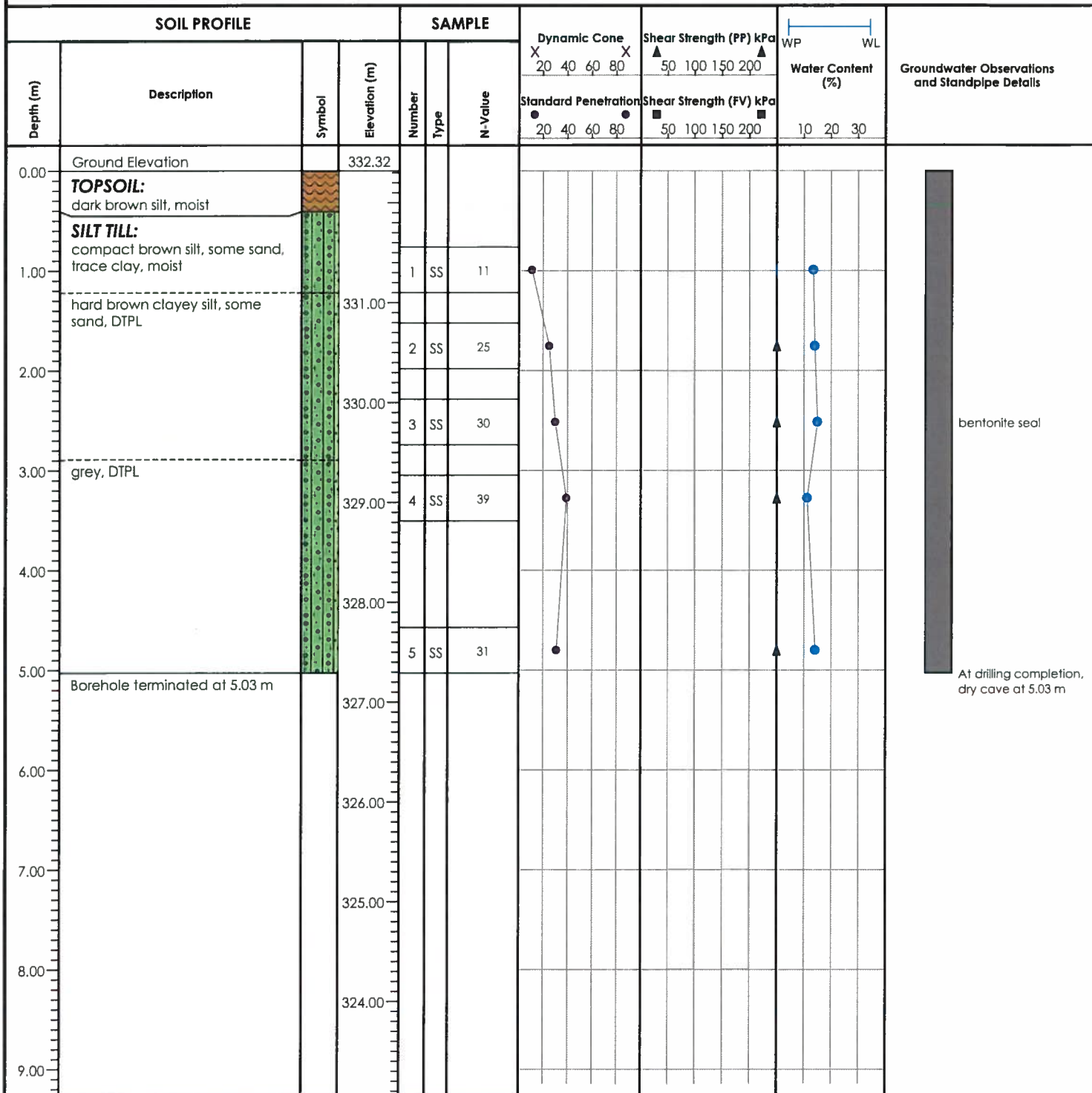
Ground Elevation: 332.32 m

Project: Activa Waterloo East Lands

Job No.: 5830G1

Location: Waterloo, Ontario

Drill Date: October 28, 2005



Reviewed by: DN
Drill Method: Solid Stem Auger
Notes:

Field Tech.: RM
Sheet: 1 of 1
Drafted by: DC (01a)



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Borehole Number: 2

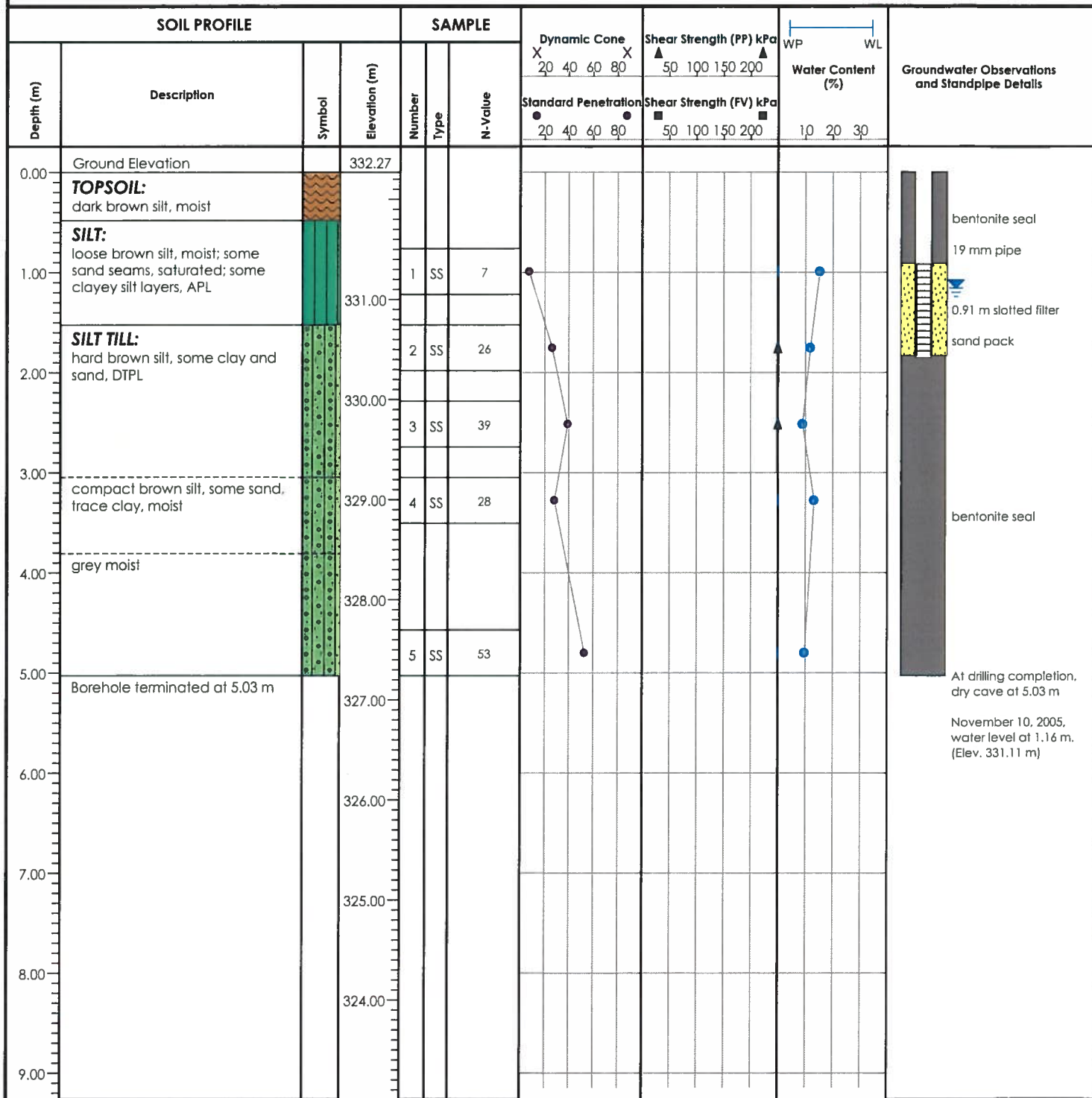
Ground Elevation: 332.27 m

Project: Activa Waterloo East Lands

Job No.: 5830G1

Location: Waterloo, Ontario

Drill Date: October 28, 2005



Reviewed by: DN

Drill Method: Solid Stem Auger

Notes:

Field Tech.: RM

Sheet: 1 of 1

Drafted by: DC (01a)



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Borehole Number: 3

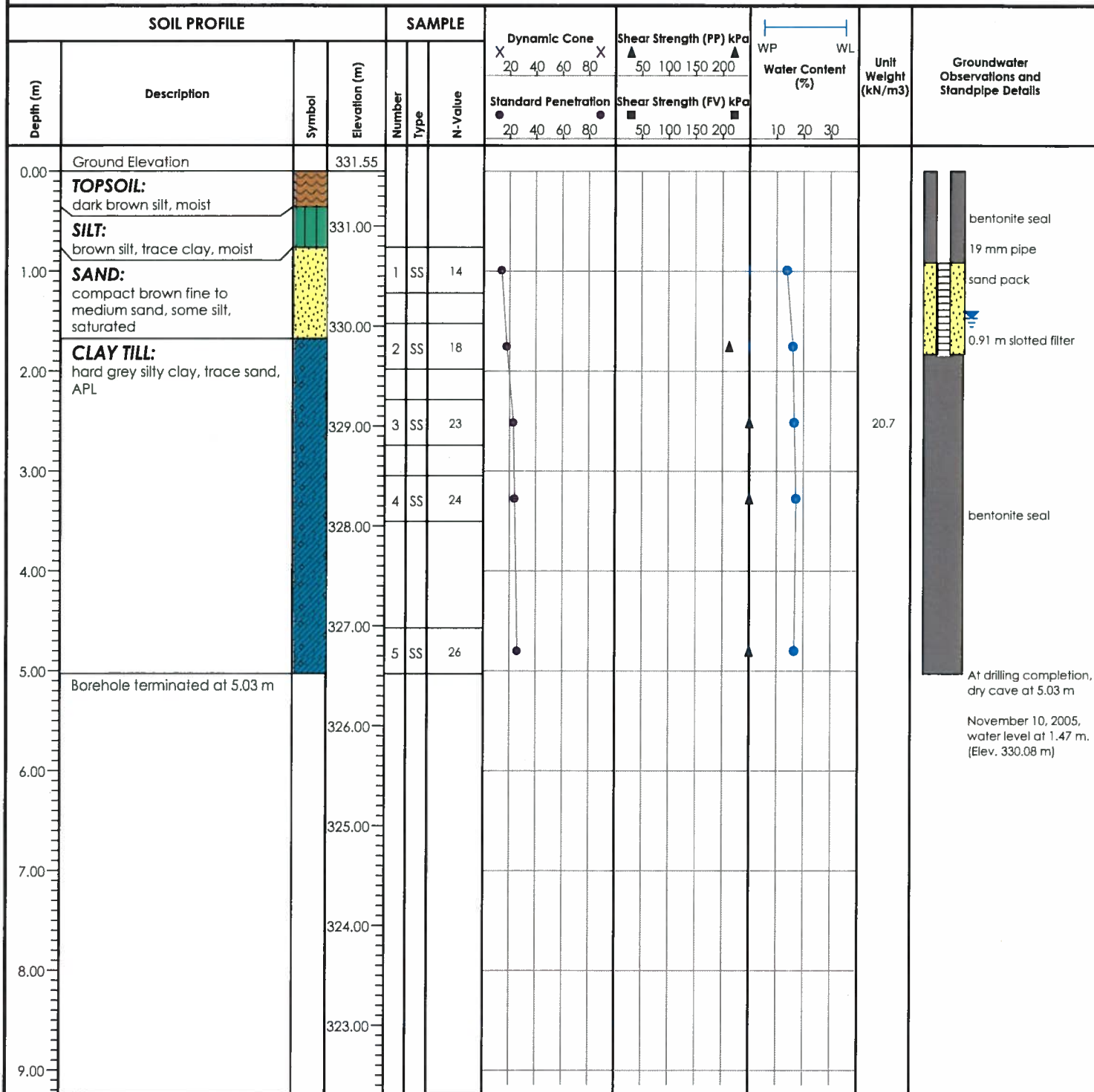
Ground Elevation: 331.55 m

Project: Activa Waterloo East Lands

Job No.: 5830G1

Location: Waterloo, Ontario

Drill Date: October 28, 2005



Reviewed by: DN

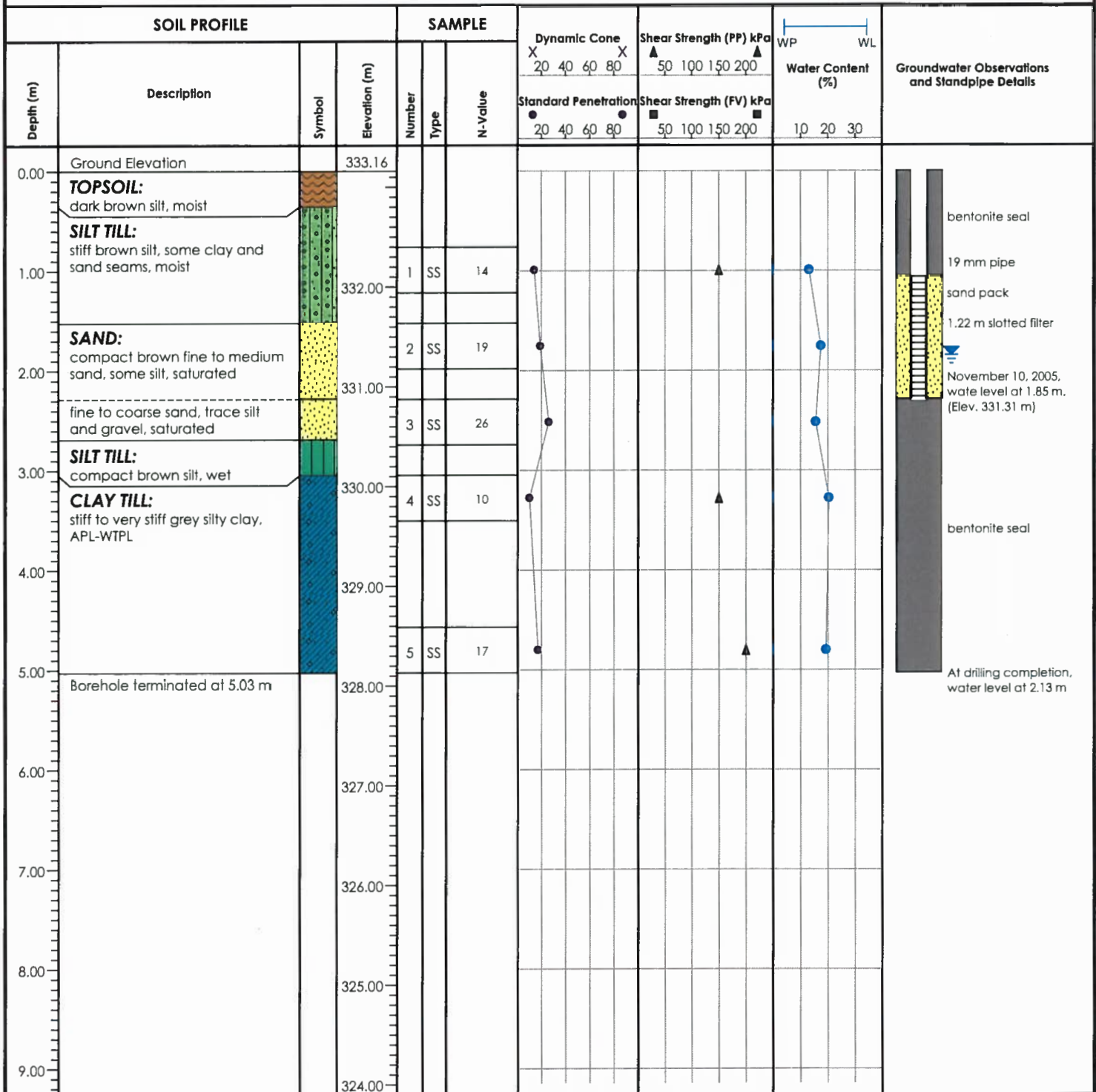
Field Tech.: RM

Drill Method: Solid Stem Auger

Sheet: 1 of 1

Notes:

Drafted by: DC (01h)



Reviewed by: DN

Drill Method: Solid Stem Auger

Notes:

Field Tech.: RM

Sheet: 1 of 1

Drafted by: DC (01a)



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Borehole Number: 8

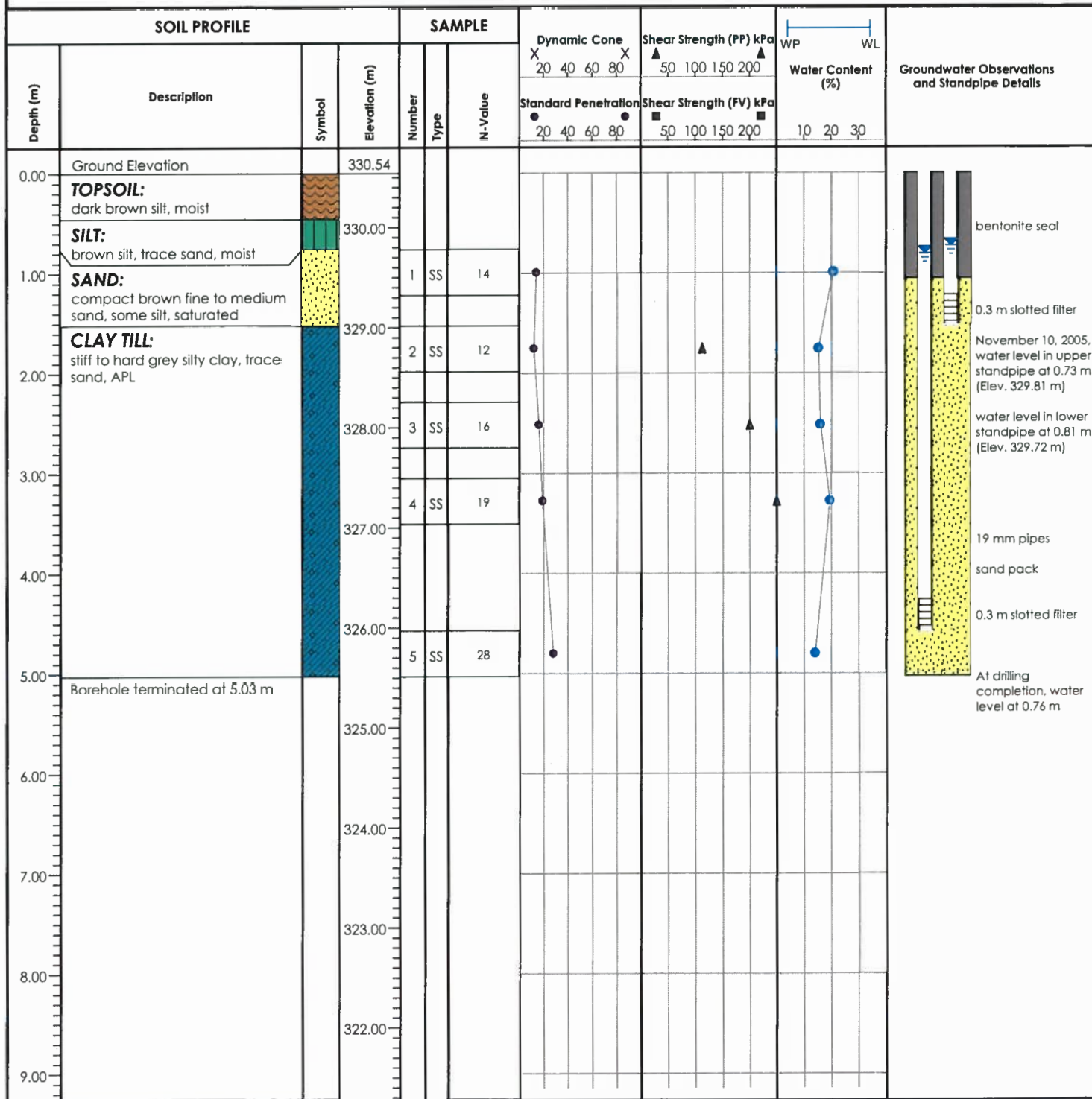
Ground Elevation: 330.54 m

Project: Activa Waterloo East Lands

Job No.: 5830G1

Location: Waterloo, Ontario

Drill Date: November 1, 2005



Reviewed by: DN
Drill Method: Solid Stem Auger
Notes:

Field Tech.: RM
Sheet: 1 of 1
Drafted by: DC (01a)



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Borehole Number: 9

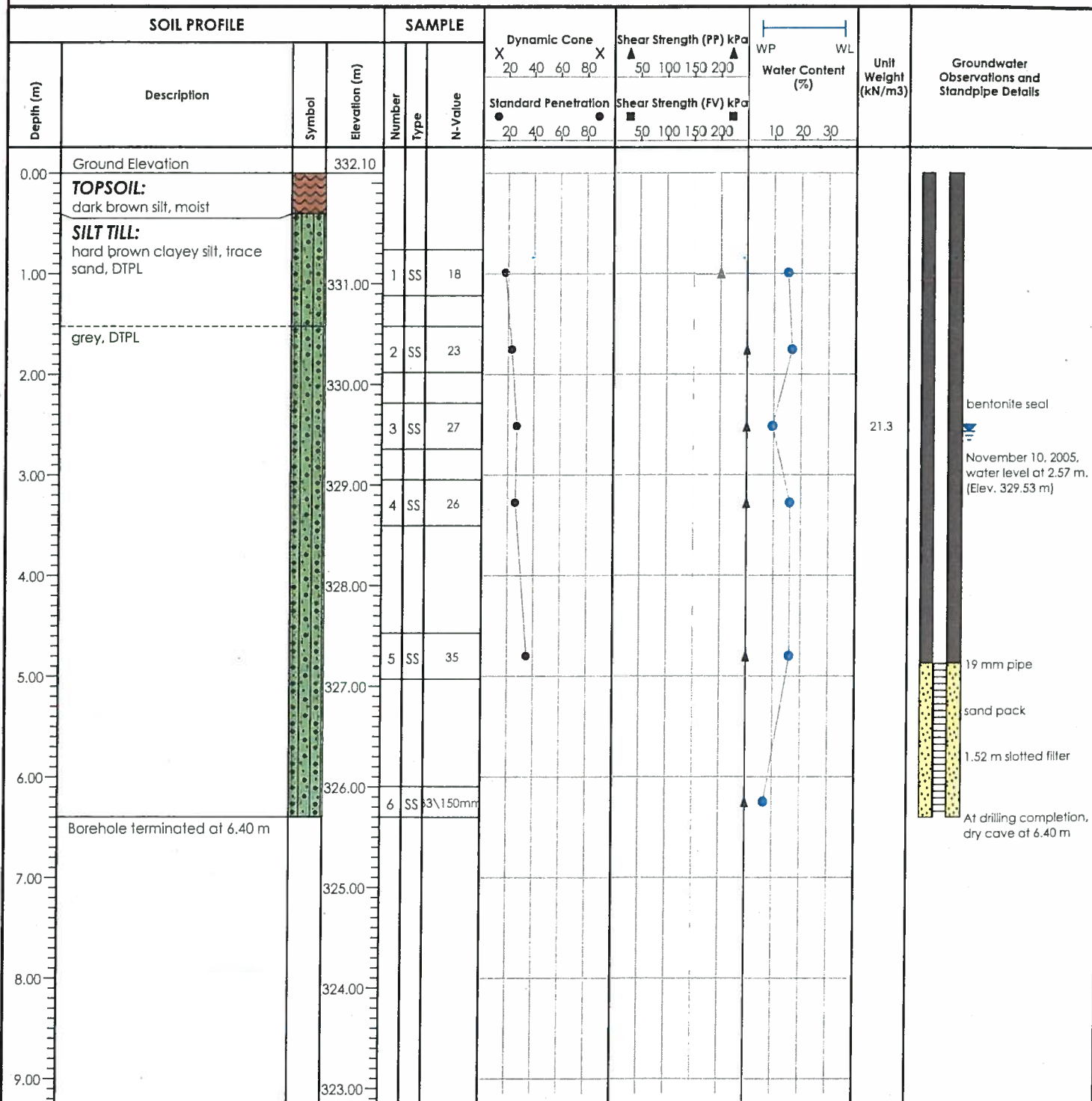
Ground Elevation: 332.10 m

Project: Axtiva Waterloo East Lands

Job No.: 5830G1

Location: Waterloo, Ontario

Drill Date: October 28, 2005



Reviewed by: DN

Field Tech.: RM

Drill Method: Solid Stem Auger

Sheet: 1 of 1

Notes: Bulk sample taken from 1.52 to 3.05 m.

Drafted by: DC (01h)



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Borehole Number: 10

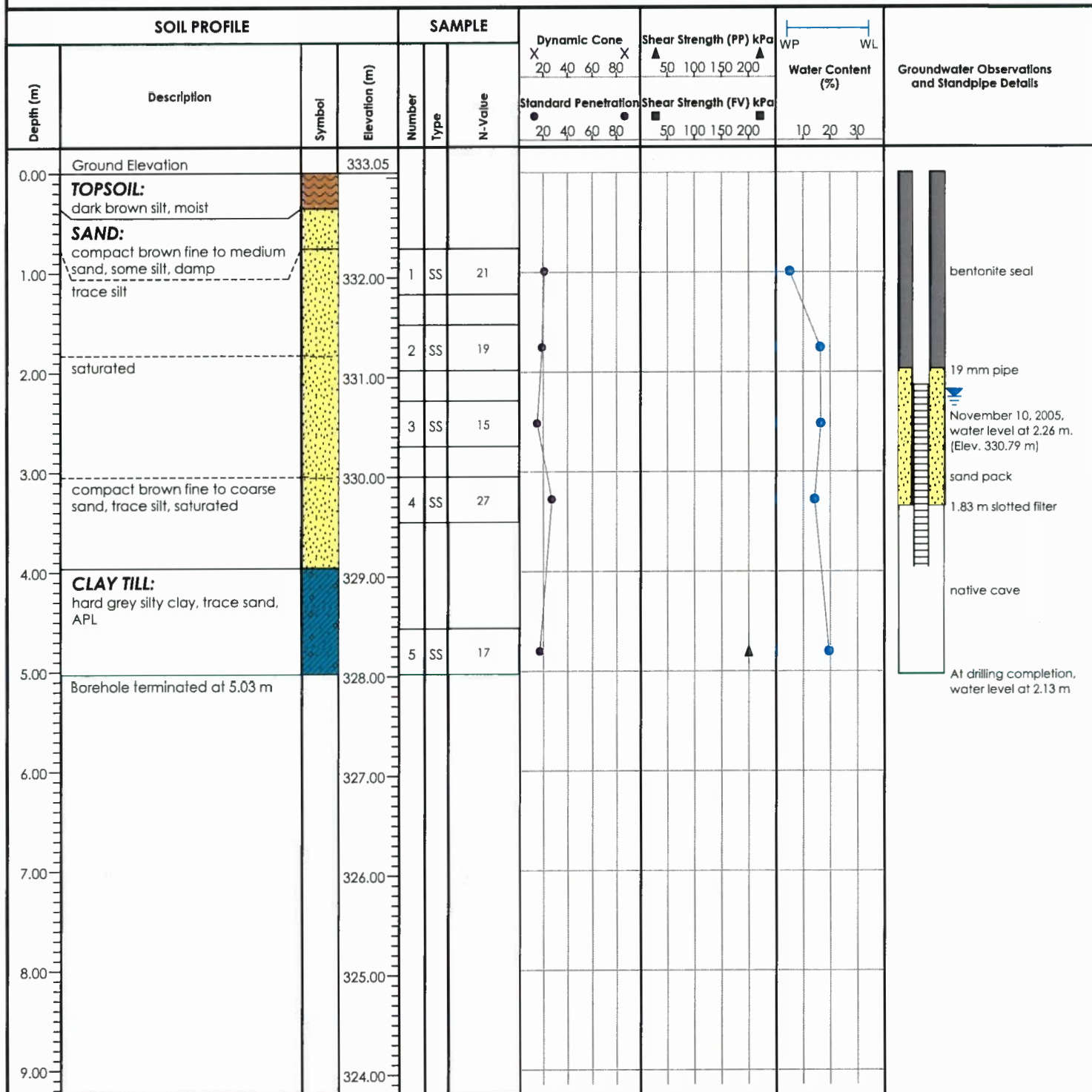
Ground Elevation: 333.05 m

Project: Activa Waterloo East Lands

Job No.: 5830G1

Location: Waterloo, Ontario

Drill Date: October 28, 2005



Reviewed by: DN

Drill Method: Solid Stem Auger

Notes:

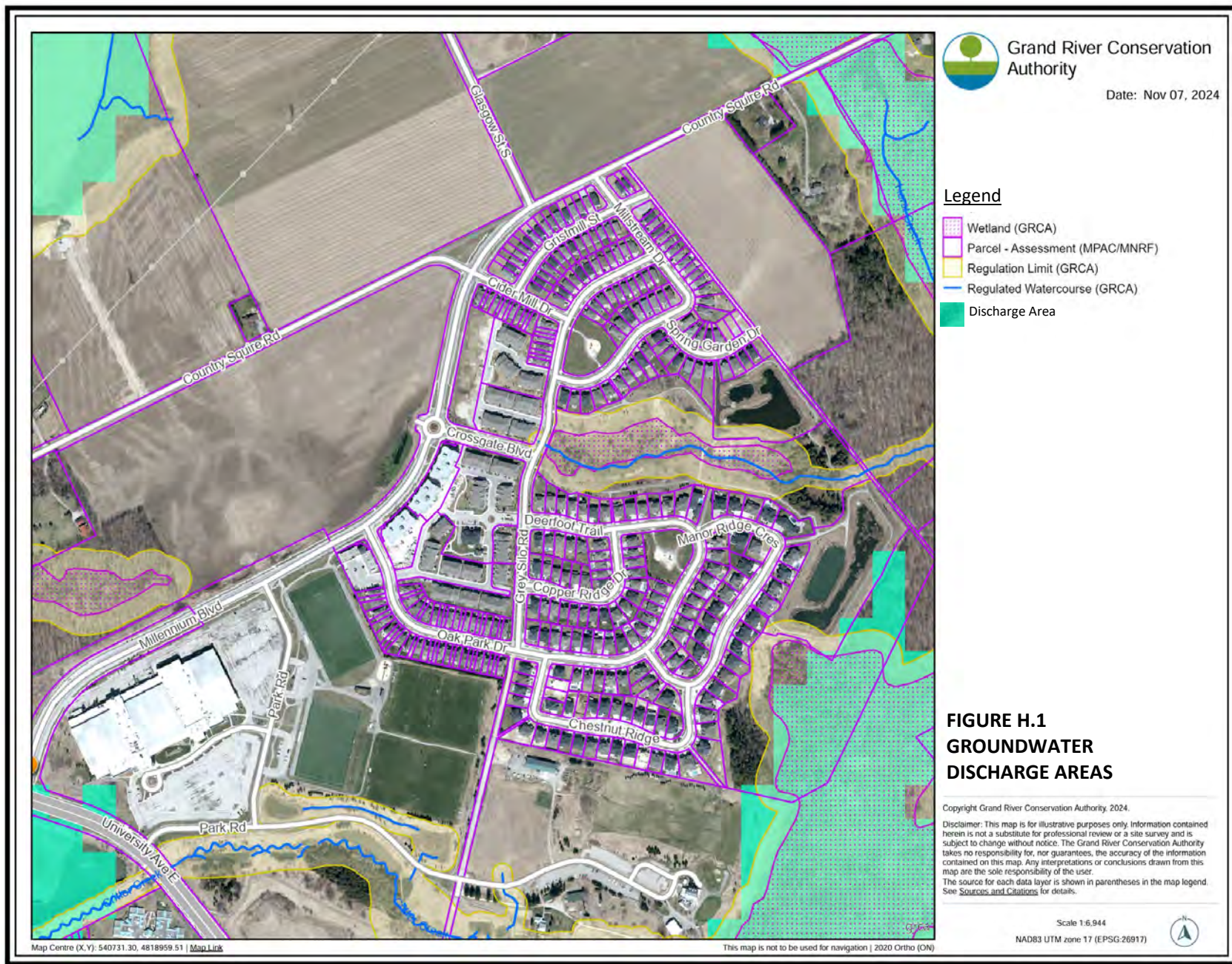
Field Tech.: RM

Sheet: 1 of 1

Drafted by: DC (01a)

Appendix H Regional Groundwater Discharge Mapping





Source: Grand River Information Network (GRIN). 2024. <https://data.grandriver.ca/applications.html>.